CHAPTER SIX - CORRECTIVE MAINTENANCE

6.0 INTRODUCTION

This chapter describes disassembly, inspection, repair and reassembly procedures for the VITAL•CHECK instrument. Calibration and testing is required after reassembly, as is explained in section 6.9 through 6.12.

Familiarity with the function and operation of the mechanical assemblies and electrical circuits will facilitate repair and replacement. Refer to Chapter Three, FUNCTIONAL DESCRIPTION and Chapter Five, TROUBLESHOOTING, as necessary.

WARNING: Disconnect the instrument from AC power before disassembly. Use extreme care when servicing an instrument that is connected to AC power. Hazardous voltages are present when AC power is connected, regardless of the setting of the ON/OFF switch.

CAUTIONS:

1) Do not use LOCTITE thread adhesive on case screws. The outgassing may cause the case to crack.

2) Exercise care and use proper grounding techniques when handling board assemblies. All PW boards contain static sensitive components. All IC's, small transistors, small diodes, and precision metal film resistors (1% type) are considered sensitive. Power diodes (rectifiers) and power transistors are not sensitive. CMOS and MOS IC's and transistors are most sensitive.

NOTE: Do not remove dump valve from manifold assembly. Air leaks could occur due to improper seating of rubber gasket. Replace manifold assembly if dump valve is defective.

IVAC recommends that the instrument be disassembled no more than is required to effect inspection or repair. Repairs will generally be localized to a particular subassembly of the instrument. Disassembly and repair procedures for each major subassembly are organized in a self-contained section of this chapter. The disassemblies are outlined in table 6-1.

Table 6-1. Disassembly and Repair Index

Heading	Section
DISASSEMBLY	6.2
Battery	
Writing Table	
Cases (Front/Rear)	
POWER SUPPLIES	6.3
Transformer	
Circuit Breaker	
Power Cord Socket	
Power Regulator Board	
PNEUMATIC ASSEMBLY	6.4
Preliminary Steps	
Leaker Assembly	
Overpressure Switch	
Pump Assembly	
Manifold Assembly	
Reservoir	
Logic/Analog and Display/ Thermometer Boards	6-5
Front Case Assembly	6-6
Rear Case Assembly	6-7
User Interface Switches	6-8

6.1 TOOLS, TEST EQUIPMENT, AND SUPPLIES

Refer to table 6-2 for the tools and test equipment required for corrective maintenance and calibration.

Table 6-2. Tools, Test Equipment, and Supplies

Item Name	Manufacturer/Model No.
Pressure gauge	WALLACE AND TIERNAN (201-759-8000), Model 1500 (0-800 mmHg), Heise Model 901A (0-500 mmHg), or equivalent
Digital multimeter (DMM)	FLUKE, 8040 (203-426-3115) or equivalent
DIP clip, 28 pin	
Test leads	(Compatible with DIP clip and DMM)
Controlled solder station	WELLER, TC 202 or equivalent
Pressure calibration test fixture	(Constructed as per figure 6-1)
Long-nose pliers	
Trimpot adjustment tool	
Screwdrivers	Phillips, no. 1, magnetic tipped Phillips, no. 2, flat bladed, 1/8 by 6 in.
Blood pressure cuff	IVAC Corp. (Model 1148)
Air hose	IVAC Corp. (Model 1131)
Substitute arm	Cylinder (3 ±1 in. diameter; cardboard, acrylic, or other material)
Temperature probe	IVAC, P1880L or P1882L

Circulating water bath or temperature tester (for calibration)	BRONWIL, 1420M or equivalent, or IVAC, P/N 191815
Calibration tester	IVAC, Model 828A
Lubricant (for instrument)	Dupont, Kyrtox GPL-205 (phone: 1-800-441-9942)
Lubricant (for O-ring)	GE, G321 Vesilube (phone: 518-237-3330)
Safety tester	DYNATECH, Model 232B or equivalent
Variable DC power supply	POWER DESIGN, Model 6050A or equivalent
Resistor 50Ω, 25W	DALE, RH25, 50Ω, ±3%
Resistor 10Ω, 50W	DALE, RH50, 10Ω, ±3%
Tee fitting (2) or	IVAC, P/N 303815
4-End double tee fitting	IVAC, P/N 302592
Reservoir	IVAC, P/N 120078
Tubing	IVAC, P/N 303154
CAL extender	IVAC P/N 191097

NOTE: The use of the reservoir replaces the need for a substitute arm and blood pressure cuff.

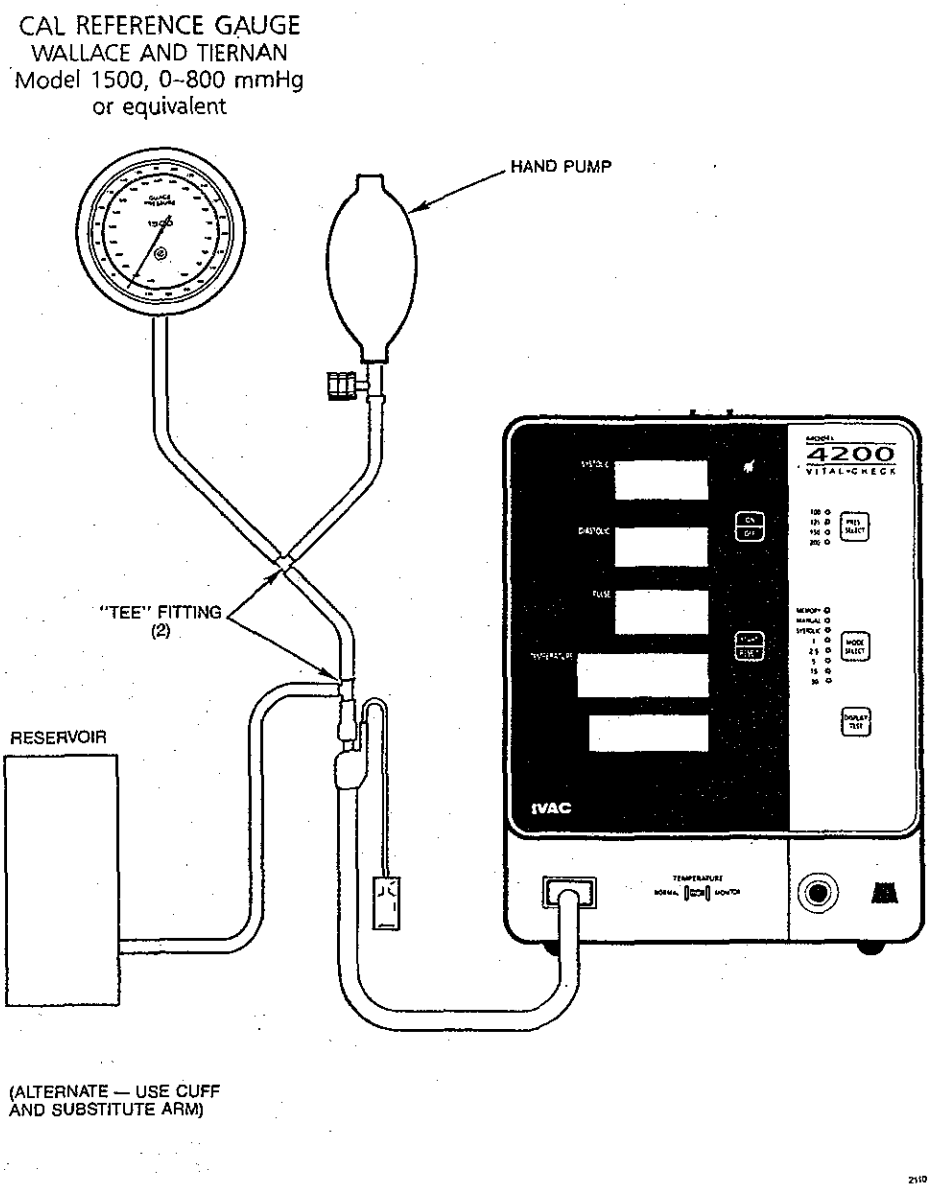


Figure 6-1. Pressure Calibration Test Fixture

6.2 DISASSEMBLY

Some preliminary disassembly is required to gain access to the functional components of the instrument. Figures 6-2 and 6-3 show the internal location of the major subassemblies and their screws.

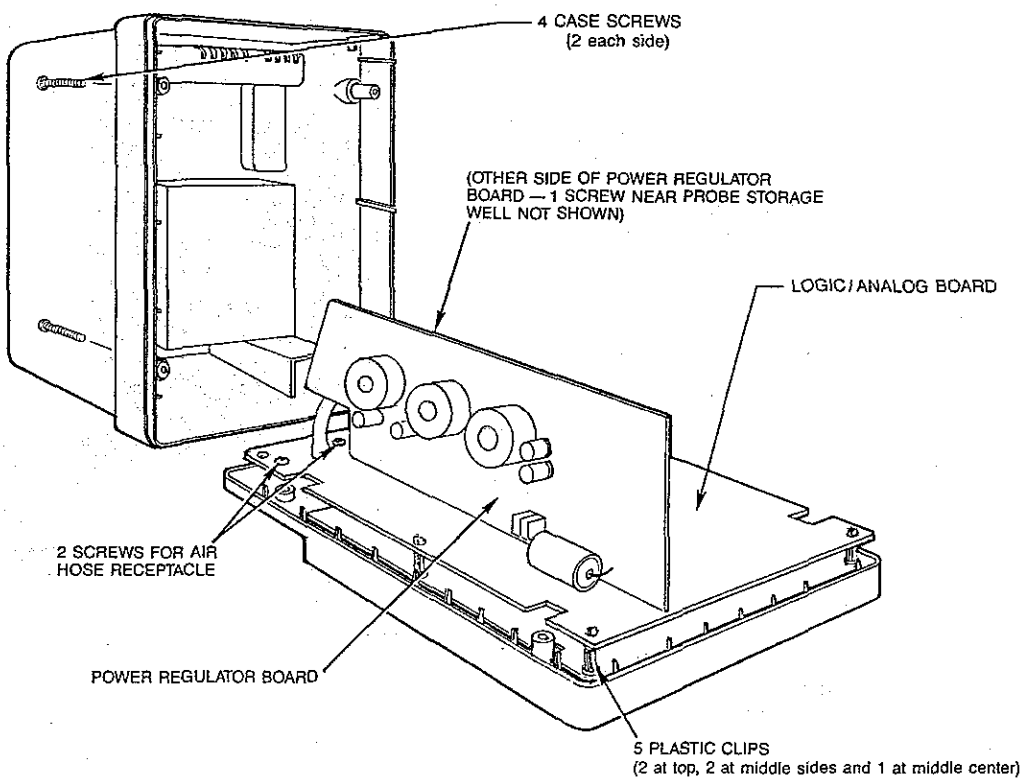

4 CASE SCREWS
(2 each side)
(OTHER SIDE OF POWER REGULATOR BOARD — 1 SCREW NEAR PROBE STORAGE WELL NOT SHOWN)
LOGIC/ANALOG BOARD
2 SCREWS FOR AIR HOSE RECEPTACLE
POWER REGULATOR BOARD
5 PLASTIC CLIPS
(2 at top, 2 at middle sides and 1 at middle center)

Figure 6-2. Accessing Logic/Analog Board

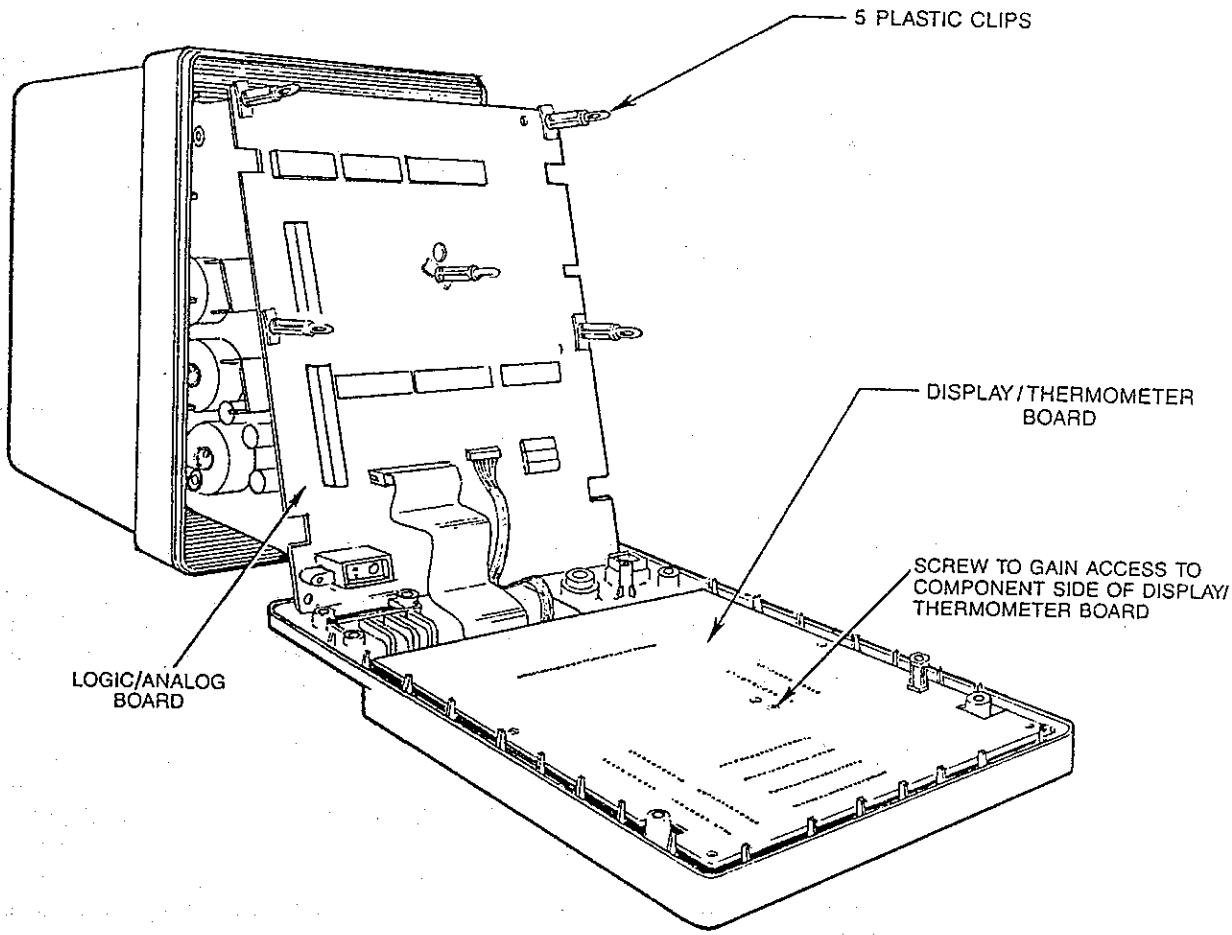

5 PLASTIC CLIPS
DISPLAY/THERMOMETER BOARD
SCREW TO GAIN ACCESS TO COMPONENT SIDE OF DISPLAY/ THERMOMETER BOARD
LOGIC/ANALOG BOARD

Figure 6-3. Accessing Display/Thermometer Board

6.2.1 Battery (figure 8-5A, item 202)

a. Place the instrument face down on a soft surface so as not to scratch the front.

b. Using a Phillips head (no. 1) screwdriver, remove the two thread-forming screws (items 113) securing the battery cover (item 203), then remove cover.

c. Locate and disconnect the battery harness connector (item 221).

d. Gently lift the battery pack (item 202) out of the instrument, being careful not to let the harness (item 221) slide inside the instrument.

e. Service/replace, as necessary.

f. To reassemble:

1. Reconnect battery harness and return battery pack back into pocket, placing against foam side first.

2. Reinstall battery cover.

g. Verify operation per section 6.12.

h. Note that when all power has been removed from the instrument, line power must be applied momentarily before the instrument will function on battery power.

6.2.2 Writing Table (figure 8-5A)

a. Place the instrument face down on a soft surface so as not to scratch the front.

b. Using a Phillips head (no. 1) screwdriver, remove the two thread-forming screws (items 113) securing the writing table.

c. Slide the table out of its catch and remove it.

d. Service/replace, as necessary.

e. To reassemble, slide the table back into front catch and reinstall screws.

6.2.3 Cases (figure 8-5A)

a. Place the instrument face down on a soft surface so as not to scratch the front.

b. Using a Phillips head (no.1) screwdriver, remove the 4 screws (items 110) securing the front and back cases.

c. Place the instrument upright on a static-protected surface, then slide the front case forward. Disconnect battery harness from regulator board. Rotate front case so that it can be laid on its face.

d. Remove ground harness from logic/analog board (J10).

e. To reassemble, slide the front case backward and rotate it backward onto its face, then reinstall screws. Ensure that the regulator board is placed in the slot to guide it back in place.

6.3 POWER SUPPLIES (figures 8-5A, 8-5B, and 8-5C)

The power supply consists of the battery (item 202), transformer (item 205), circuit breaker (item 206), power cord socket (item 210), and power regulator board (item 16). The instrument clip fuse F101 (2.5A) and fuse F102 (5A) are located on the power regulator board and are accessible after case disassembly per section 6.2.3.

WARNING: Disconnect the instrument from AC power before disassembly. Use extreme care when servicing an instrument that is connected to AC power. Hazardous voltages are present when AC power is connected, regardless of the setting of the ON/OFF switch.

6.3.1 Transformer (figure 8-5C, item 205)

a. Perform case disassembly per section 6.2.3.

b. Disconnect the transformer wiring harness from J104 on the power regulator board (item 16). (See figure 6-4.)

c. Disconnect the transformer wiring harness from the circuit breaker, black wire and line cord socket, white wire.

d. Remove the two machine screws (items 212) and washers (items 116) from the transformer and move grounding harness (item 219) out of the way. Remove transformer shield (item 117).

e. Service/replace, as necessary.

f. To reassemble:

1. Reconnect transformer onto locating posts and secure with machine screws and washers, being sure to reconnect ground harness.

2. Torque screws to 12-15 inchpounds, minimum.

3. Reconnect wiring harnesses.

g. Verify operation per section 6.11.

6.3.2 Circuit Breaker (figure 8-5C, item 206)

a. Perform case disassembly per section 6.2.3.

b. Remove hex nut from circuit breaker on rear case.

c. Pull circuit breaker (item 206) out of mounting hole from inside and remove power harness (item 220) and disconnect black wire from transformer assembly.

d. Service/replace, as necessary.

e. To reassemble:

1. Reconnect harnessing and reinsert through D-hole in back case.

2. Retighten hex nut onto circuit breaker.

f. Verify operation per section 6.11.

6.3.3 Power Cord Socket (figure 8-5C, item 209 or 219)

a. Perform case disassembly per section 6.2.3.

b. Remove ground harness (item 219) from logic/analog board (item 15), mounting bracket (item 208), and transformer (item 205).

c. Remove black and white wires from power cord socket.

WIRING DIAGRAM (Source 124468)

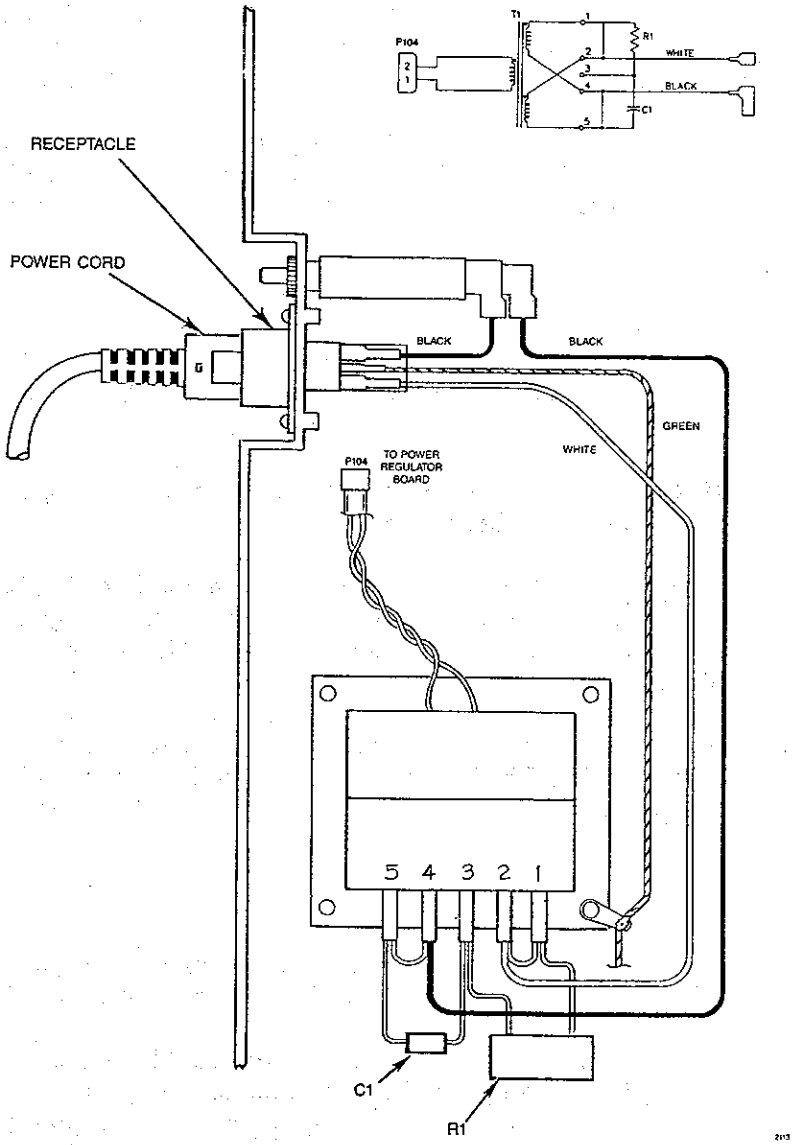


Figure 6-4. Transformer/CB/Cord Wiring Diagram

d. Remove the two thread-forming screws (item 215) retaining the socket (item 209) and cord retainer (item 210), then pull ground strap through the hole.

e. Service/replace, as necessary.

f. To reassemble:

1. Push grounding strap through hole and reinstall socket and cord retainer, being sure that ground pin on the socket is towards the center of the instrument.

2. Reconnect the grounding strap to the transformer, mounting bracket, and logic/analog board, being sure to torque transformer mount screw to 12-15 inchpounds.

6.3.4 Power Regulator Board (figure 8-5C, item 16)

a. Perform case disassembly per section 6.2.3.

b. Disconnect the battery harness (item 221) from J105 on the power regulator board (item 16).

c. Disconnect the transformer harness (item 205) from J104 on the power regulator board.

d. Holding the back of the logic/analog board (item 15), pull up on notched (bottom) corner of the power regulator board to remove, being careful not to bend the pins on power regulator board.

e. The power regulator board is serviceable; refer to Chapter Three, FUNCTIONAL DESCRIPTION, and Chapter Eight, ILLUSTRATED PARTS BREAKDOWN (figure 8-14) to identify any defective component.

f. To reassemble:

1. Align the pin on the power regulator board closest to the notch with its hole in the logic/analog board.

2. Using a scissor action, press the power regulator board pins through holes in the logic/analog board, and into their connector, being sure edge of power regulator board is against the back of the logic/analog board, to ensure pins are fully seated.

3. Reconnect the battery and transformer harnesses.

6.4 PNEUMATIC ASSEMBLY (figures 8-5C and 8-7)

Removal of the pneumatic assembly is not necessary for most pneumatic component repairs. However, removal is outlined here for those sections where it is required.

6.4.1 Preliminary Steps

a. Perform case disassembly per section 6.2.3.

b. Remove the silicone tubing (item 261) leading to the assembly from the tee fitting (item 264) at the logic/analog board (item 15).

c. Remove the pneumatic ribbon cable from the pneumatic assemblies transition board (item 267). Press both tabs away from connector to loosen pneumatic ribbon cable.

d. Remove the three thread-forming screws (item 215) and upper washers (item 217) holding the pneumatic assembly (item 20).

e. Lift the module off its mounting bosses and out of the back case.

6.4.2 Leaker Assembly (figure 8-7, item 254)

a. Perform preliminary disassembly per section 6.2.3.

b. Disconnect the leaker harness from the transition board (item 267).

c. Remove the two thread-forming screws (items 266) securing the leaker and remove leaker.

d. Remove silicon tubing from leaker.

e. Service/replace, as necessary.

f. To reassemble:

   1. Align leaker with mounting holes and install thread-forming screws, being careful not to overtighten.

   2. Reconnect leaker harness to transition board.

g. Verify proper function per section 6.12.

6.4.3 Overpressure Switch (figure 8-7, item 257)

a. Perform case disassembly per section 6.2.3.

b. Disconnect pressure switch harness (item 268) from transition board (item 267).

c. Slide pressure switch out from under the plastic catch, then remove it and the silicon tubing (item 261) from manifold (item 252).

d. Remove silicon tubing from pressure switch.

e. Service/replace, as necessary.

f. To reassemble:

1. Push the silicon tubing all the way onto pressure switch fitting marked "P" and then onto nipple on manifold.

2. Slide the other switch fitting under the manifolds plastic catch, install harness onto transition board.

g. Verify proper function per section 6.12.

6.4.4 Pump Assembly (figures 8-7 and 8-13, item 253)

a. Perform case disassembly per section 6.2.3.

b. Disconnect pump assembly harness from the transition board (item 267).

c. Remove the three thread-forming screws (item 263) holding the motor bracket to the manifold (item 252) using a Phillips (no. 1) screwdriver, then remove pump assembly.

d. To service with lubricant:

1. Slide piston (item 278) off eccentric drive (item 277) and clean piston hole and eccentric shaft with a clean cotton swab or lint-free cloth.

2. Apply pump lubricant (KYRTOX - GPL 205) to eccentric shaft and piston hole, then slide the piston onto eccentric shaft, being sure piston face with four small depressions is towards the motor.

e. Replace, as necessary.

f. To reassemble:

1. Rotate eccentric and piston to full up position, so that diaphragm is against motor bracket.

2. Align pump assembly with manifold mounting holes and seat into pocket.

3. Reinstall the thread-forming screws, being careful not to overtighten.

4. Attach pump harness to transition board.

g. Verify proper function per section 6.12.

6.4.5 Manifold Assembly (figures 8-6 and 8-7, item 252)

a. Perform case disassembly per section 6.2.3.

b. Remove pneumatic assembly (item 20) per section 6.4.1.

c. Perform disassembly portions of sections 6.4.2, 6.4.3, and 6.4.4.

d. Remove the self-sealing machine screw and its o-ring (item 262).

e. Remove the thread-forming screws (item 266, 2 places) to separate reservoir assembly and remove transition board (item 267). Remove silicon tubing section from manifold assembly.

f. Pull reservoir from manifold assembly (item 252), noting o-ring (item 258) placement.

g. Roll vibration grommets (item 259) out of mounting slots on manifold.

h. Service/replace, as necessary.

i. To reassemble:

1. Squeeze and roll vibration grommets into manifold slots.

2. Apply lubricant (G321) to o-ring. Seat large o-ring against the ridge on the reservoir (item 251).

3. Seat the reservoir and o-ring into the manifold and reinstall self-sealing machine screw and thread-forming screw.

4. Reattach silicon tubings and reassemble individual components per above sections.

5. Install pnuematic assembly onto three mounting bosses, being sure the proper washer sandwiches the vibration grommet on both sides, then reinstall screws. Do not overtighten screws because the case may crack as a result.

6. Attach ribbon cable. Ensure tabs click back in place to lock connector in place.

j. Verify proper function per section 6.12.

6.4.6 Reservoir (figure 8-7, item 251)

a. Perform case disassembly per section 6.2.3.

b. Remove pneumatic assembly (item 20) per section 6.4.5.

c. Ensure self-sealing machine screw and its o-ring (item 262) and thread-forming screw (item 266) are removed.

d. Pull reservoir (item 251) from manifold (item 252) and remove o-ring (item 258).

e. Service/replace, as necessary.

f. To reassemble:

1. Apply lubricant (G321) to o-ring. Seat o-ring against flange on reservoir.

2. Seat reservoir and o-ring into manifold and reinstall screws.

3. Install pneumatic assembly onto the three mounting bossess, being sure a washer sandwiches the mounting grommet on both sides, then reinstall screws.

4. Attach ribbon cable. Ensure tabs click back in place to lock connector in place.

g. Verify proper function per section 6.12.

6.5 LOGIC/ANALOG AND DISPLAY/THERMOMETER BOARDS (figure 8-5B)

a. Perform case disassembly per section 6.2.3.

b. Remove pneumatic ribbon cable from the pneumatic assembly (item 20).

c. Perform power regulator disassembly per section 6.3.4.

d. Remove ground wire from logic/analog board (part of item 219).

e. Remove the two machine screws by the cuff receptacle (items 112) and the thread-forming screw by probe well (item 113) from the accessory attachment end of the board.

f. Using a Phillips magnetic-tip screwdriver, remove the thread-forming screw (item 113) through the center of the logic/analog board (item 15), holding the temperature/display board (item 17) in place.

g. Lift the board set (both boards) off the front case (item 11) and rotate it back up against the rear case (item 10); note the cable placement.

h. Pull the display/thermometer board off the logic/analog board at each of the five snap-in standoffs (items 114) and lay it back into the front case.

i. Unplug the fan-folded ribbon cable and the touch-switch tail flex cable.

j. To service, refer to Chapters Three, FUNCTIONAL DESCRIPTION, Five, TROUBLESHOOTING, and Eight, ILLUSTRATED PARTS BREAKDOWN (figures 8-15 and 8-16) for further information.

k. To reassemble:

   1. Assemble display/thermometer board and thread-forming screw, holding front case. Ensure that board lays flat on supports on the front case.

   2. Attach the touch-switch tail flex cable and fan-folded ribbon cable to the logic/analog board, aligning front case and display/thermometer board mount holes.

3. Snap standoff attached to logic/analog board through the holes on the display/thermometer board, being sure all accessory connectors and the normal monitor switch are properly seated into or through their mounting holes, then reinstall screws.

4. Reinstall power regulator board per section 6.3.4.

1. Verify proper function per section 6.12.

6.6 FRONT CASE ASSEMBLY (figure 8-3, item 11)

a. Perform case disassembly per section 6.2.3.

b. Perform logic/analog disassembly (except for removal of the power regulator board), per section 6.5.

c. Service/replace, as necessary.

d. To reassemble, perform the logic/analog reassembly per section 6.5.

e. Ensure ribbon cable to pneumatic module clears case and allows access to DIP switch (S2).

f. Verify proper function per section 6.12.

6.7 REAR CASE ASSEMBLY (figures 8-4, 8-5A and 8-5C, item 10)

a. Perform case disassembly per section 6.2.3.

b. Remove the two thread-forming screws (items 113) and one machine screw (item 213), to remove the mounting bracket (item 208).

c. Once removed from instrument, remove grounding harness (item 219) from bracket, if not already removed.

d. Perform the battery, transformer, circuit breaker, power cord socket, and pneumatic assembly disassemblies per sections 6.2.1, 6.3.1, 6.3.2, 6.3.3, and 6.4.1.

e. Remove the test cover retaining screw (item 113) and cover (item 13).

f. Service/replace, as necessary.

g. To reassemble:

1. Reinstall test cover retaining screw and cover.

2. Perform sections 6.4.1, 6.3.3, 6.3.2, 6.3.1, and 6.2.1, respectively.

3. Reinstall grounding harness to bracket and the two thread-forming screws and one machine screw to the mounting bracket.

4. Perform case reassembly per section 6.2.3.

h. Verify proper function per section 6.12.

6.8 USER INTERFACE SWITCHES

NOTE: To service, replacement of the front case assembly is required (figure 8-3, item 11).

6.9 CALIBRATION

If at any stage of this procedure the instrument cannot be calibrated, corrective maintenance may be required. Refer to Chapter Five, TROUBLESHOOTING.

WARNING: Use extreme caution in servicing the instrument when connected to AC power. Hazardous voltages are present when AC power is connected, regardless of the position of the ON/OFF switch.

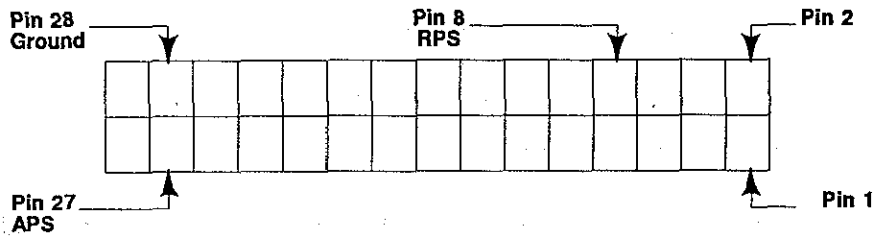
NOTE: Any time the system is pressurized above 20 mmHg, a hardware timer will be operating and will disable the instrument when it times out after a period of 4.5 minutes. If this occurs during calibration, cycle the ON/OFF switch off, then on to reset the instrument.

Although the illustrations show the instrument closed, the calibration procedure is performed with the instrument opened. Sections 6.9.5, 6.9.6, and 6.9.8 may be performed on a closed instrument through the test connector. Periodic preventative maintenance can be done with the instrument closed, except for lubrication of the pump assembly. (Reference table 6-3.)

Table 6-3. Calibration Points

Test Fixture Connector

APS Signal - pin 27 of P5 (test connector)
RPS Signal - pin 8 of P5 (test connector)
Ground - pin 28 of P5 (test connector)



ADC Pins *

APS Signal - U41 pin 28
RPS Signal - U41 pin 27
Ground - U41 pin 16

*Calibration points referenced in manual (instrument opened for repair). Refer to test fixture connector pin numbers to calibrate the instrument when closed.

6.9.1 +5, +12 and -12V Checks on Power Regulator Board

CAUTION: Take care to avoid any short circuits at or around J2 and J105, as blown fuses or other damage can occur. The battery can supply enough current to damage wiring and cause injury.

a. Disconnect the battery connection, J105, on the power regulator board.

b. Connect the ground lead from the DMM (digital multimeter) to C102(-) (GND) and set the DMM on the 20 VDC range.

c. Connect the instrument to AC power.

d. Check the voltage at J2 pin 11 (+5 VAO) with the DMM; pin 11 voltage should be +5 ±0.25 volts.

e. Press the ON/OFF switch to apply power to the instrument.

f. Table 6-4 shows the four major voltage levels for driving various circuits in the instrument; check the voltage at the pins listed. If any voltages are out of range, the corresponding power regulator circuit is in need of calibration or repair.

Table 6-4. Power Supply Voltages

1. J2 Pin 10	+5.0 ±0.25 Volt (+5V Logic)
2. J2 Pin 11	+5.0 ±0.25 Volt (+5 VAO)
3. J2 Pin 13	+14.1 ±0.15 Volt (+12V)
4. J2 Pin 15	-12.0 ±1.00 Volt (-12V)

g. Disconnect instrument from AC power.

6.9.2 Check Battery Charge Voltage (Regulated DC)

a. Disconnect the battery connection, J105, on the power regulator board, if not already disconnected.

b. Set the DVM to the 20 VDC range and connect the (+) lead to J105 pin 2 and the (-) lead to C102(-) (GND).

c. Connect the instrument to the AC power source and verify that the DVM indicates 14.1 ±0.1 VDC; if it does not, adjust R121 until it is within specifications.

d. Disconnect the instrument from AC power.

6.9.3 Check Low Battery Circuit

a. Disconnect the battery connection, J105, on the power regulator board, and disconnect instrument from AC power, if not already disconnected.

b. Adjust a variable DC power supply (0-15V, 1.5A) to 14.0 volts; do not exceed this voltage.

c. Connect the power supply (+) to J105 pin 2 and the (-) to C102(-) (GND).

NOTE: Observe polarity to prevent damage to the power regulator.

d. Monitor J2 pin 3 with an oscilloscope or DVM to observe the logic level at this pin (LOWBATT-), using C102(-) as GND.

e. Momentarily connect the instrument to AC power to clear the power failsafe flip-flop, then disconnect AC power.

f. Actuate the ON/OFF switch to energize the entire power regulator (now operating from external DC power supply).

g. Test J2 pin 10 for a level of about 5 volts to ensure power regulator is energized.

h. Verify that a logic 1 is at J2 pin 3.

i. Slowly lower the DC power supply voltage and verify that voltage at J2 pin 3 goes to logic 0 when the power supply is decreased to 11.6 ±0.1V, then reset the supply to 14 volts.

j. Verify that step i can be repeated; if it cannot, adjust external power supply to 11.6 ±.05 VDC, then adjust R142 until J2 pin 3 just changes state.

k. Lower the voltage 0.1 VDC, reducing voltage very slowly, then verify that the instrument displays CHARGE BATTERY, beeps, and shuts off.

l. Turn the power supply off and remove it from the power regulator.

m. Remove the test equipment from the power regulator board.

n. Reconnect the battery to J105, being certain that the plug is not connected backward. (Improper polarity will damage the power regulator.)

6.9.4 5V Reference Voltage on Logic/Analog Board (ADC-U41)

a. Using a 28-pin DIP clip, connect a DMM to U41 pin 12(+) and U41 pin 16(-) on the logic/analog board.

b. Connect the instrument to AC power, then press the ON/OFF switch to apply power.

c. With the DMM on the 20 VDC scale, the reading should be 4.9 ±0.2 volts.

6.9.5 Pressure Channel Zero Adjustment

a. Using the 28-pin DIP clip, connect the DMM positive lead to U41 pin 28 (APS) and ground lead to U41 pin 16.

b. Set the DMM to the 2 VDC range.

c. Adjust R118 (ZERO) on the logic/analog board to a reading of 0.000 ±0.001V on the DMM. (See figure 6-6.)

6.9.6 Pressure Calibration

a. Prior to performing this adjustment, make sure that the pressure channel zero adjustment section 6.9.5 has been performed.

b. The internal DIP switch S2 is accessible through louver holes in the bottom, right-hand side of the instrument with the instrument closed (see figure 6-5); note the hospital setting of the DIP switches, nos. 1-4. (See table 6-5.)

Table 6-5. Internal DIP Switch S2 Configurations

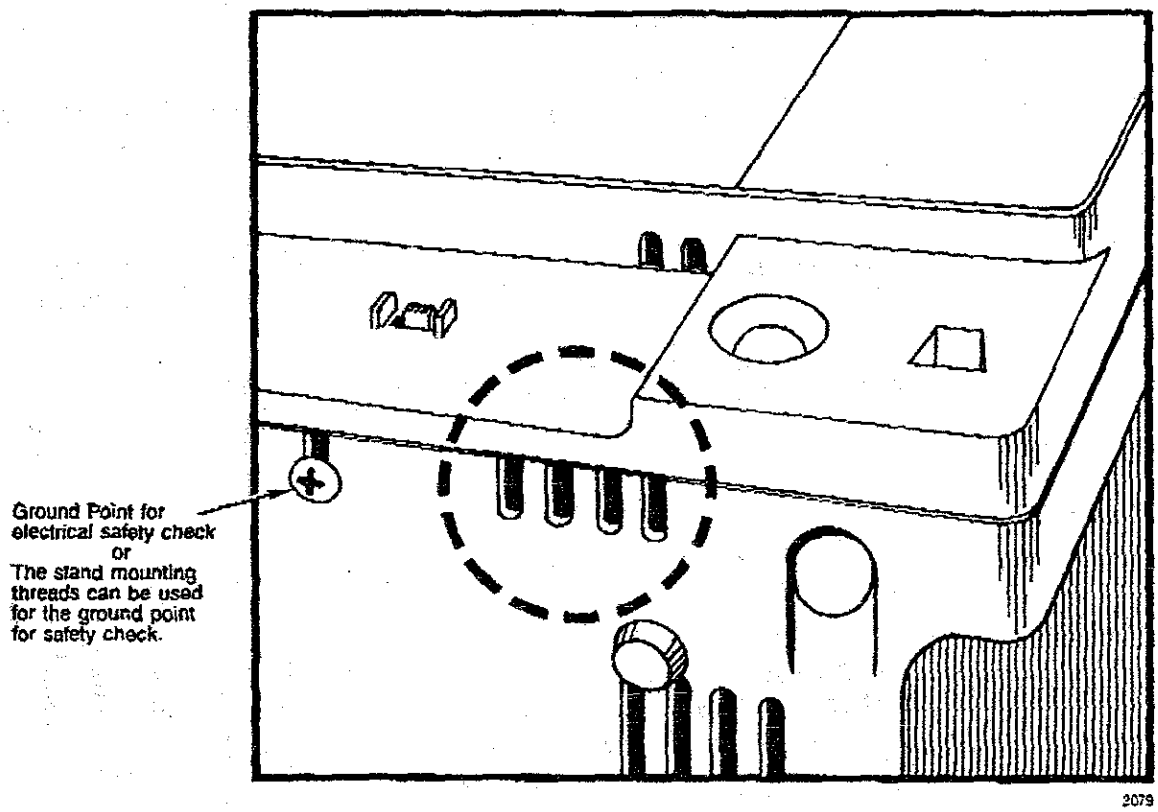
	S2 Switch Numbers					
	1	2	3	4	5	6
4200 Operating Mode:	C	C	C	C	-	C
Calibration Mode:	C	C	C	O	-	
Send-Only Mode (CIM option only):	C	O	C	C	-	
Printer Mode (CIM option only):	C	O	C	O	-	
Thermometer °F	-	-	-	-	O	
Thermometer °C	-	-	-	-	C	

Symbols: (C) closed/down; (O) open/up.

c. Set internal DIP switch S2 in the calibration mode (no. 4 to up position):

No. 1 - Down
No. 2 - Down
No. 3 - Down
No. 4 - Up

d. Ensure information display reads CAL if instrument is already turned on.


Ground Point for electrical safety check
or
The stand mounting threads can be used for the ground point for safety check.
2079

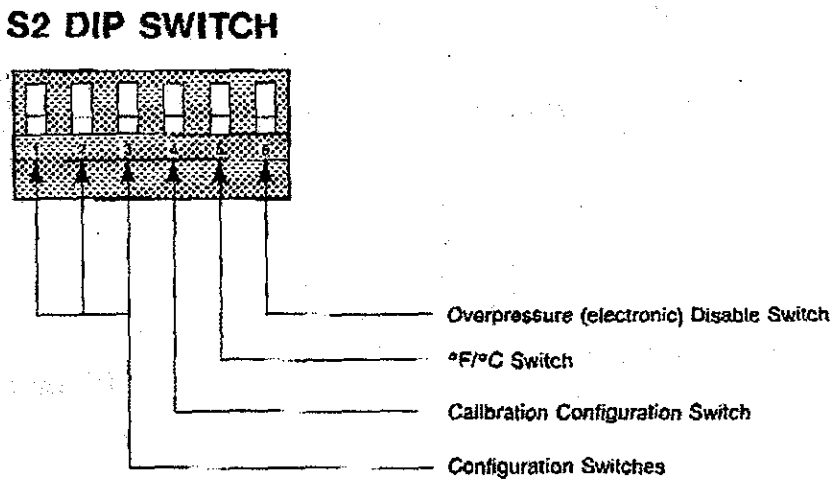


Figure 6-5. S2 Internal DIP Switch

e. As shown in figure 6-1, install pressure gauge and pressure source at the cuff nipple using a tee fitting and other fittings as required.

NOTE: Leaky fittings will reduce the reliability of the test and make calibration difficult.

f. Wrap the cuff around a cylinder (3-5 in. diameter) or use a reservoir. This will provide sufficient air volume to make calibration easier.

g. Place a 28-pin DIP clip on U41 on the logic/analog board and connect the DMM ground lead to pin 16 and the positive lead to pin 28 (APS).

h. Set the DMM to the 2 VDC range.

i. Press the ON/OFF switch to turn the instrument on and verify that the information display reads TESTING, followed by CAL, indicating that the instrument is in calibration mode, and the SYSTOLIC display reads 000, indicating that zero pressure is applied.

NOTE: In the following procedure, the setting of the PRES. SELECT switch is not an indication of the nominal applied pressure, but is used internally by the calibration software. (See table 6-6 to translate the setting of the switch to the nominal applied pressure for calibration and decoding pressure selections.)

Table 6-6. CAL Mode Pressure Selections

(Switch) Pressure: mmHg	(Gauge) CAL: mmHg
100	150
125	200
150	250
200	300

j. Set the PRES. SELECT to 125.

k. Set the MODE SELECT to MANUAL.

l. Inflate the system to about 220 mmHg on the calibration gauge and verify that the pressure stabilizes within 10 seconds after inflation and does not fall faster than 10 mmHg/min. If the pressure falls, there is a leak in the pneumatic system that must be corrected before calibration can proceed; adjust the pressure to 201.0 mmHg on the test gauge.

m. Adjust R119 (SPAN) on the logic/analog board for a reading that fluctuates between 200 and 202 on the SYSTOLIC display, being sure that the test gauge stays at 201.0 mmHg during this adjustment. (See figure 6-6.)

NOTE: The instrument has a resolution of 2 mmHg, and will read out only to the nearest even number on the SYSTOLIC display.

n. Adjust the pressure to 200.0 mmHg on the test gauge.

o. Adjust R117 (BALANCE) on the logic/analog board until a reading of 128 ±4 appears on the DIASTOLIC display, being sure that the test gauge stays at 200.0 mmHg during this adjustment. (See figure 6-6.)

p. Set the MODE SELECT to SYSTOLIC to depressurize the system and verify that the DMM indicates 0.000 ±0.003 VDC within about 10 seconds of deflation; if it does not, perform the pressure channel zero adjustment and repeat steps j through p. If step o fails a second time, the pressure sensor should be replaced.

q. Set the PRES. SELECT to 200 and the MODE SELECT to MANUAL.

r. Inflate the system to about 320 mmHg on the test gauge and wait for the pressure to stabilize.

s. Adjust the pressure until the SYSTOLIC display fluctuates between 300 and 302, then verify that test gauge reads 301.0 ±6 mmHg and the DIASTOLIC display reads 108 ±60; if either reading is out of tolerance, repeat steps j through s.

t. Set the PRES. SELECT to 150.

u. Adjust the pressure until the SYSTOLIC display fluctuates between 250 and 252, then verify that test gauge reads 251.0 ±3 mmHg and the DIASTOLIC display reads 108 ±40; if either reading is out of tolerance, repeat steps j through u.

v. Set the PRES. SELECT to 100.

w. Adjust the pressure until the SYSTOLIC display fluctuates between 150 and 152, then verify that test gauge reads 151.0 ±2 and the DIASTOLIC display reads 108 ±20; if either reading is out of tolerance, repeat steps j through w.

x. If the instrument cannot be adjusted to conform to the above specifications, refer to Chapter Five, TROUBLESHOOTING.

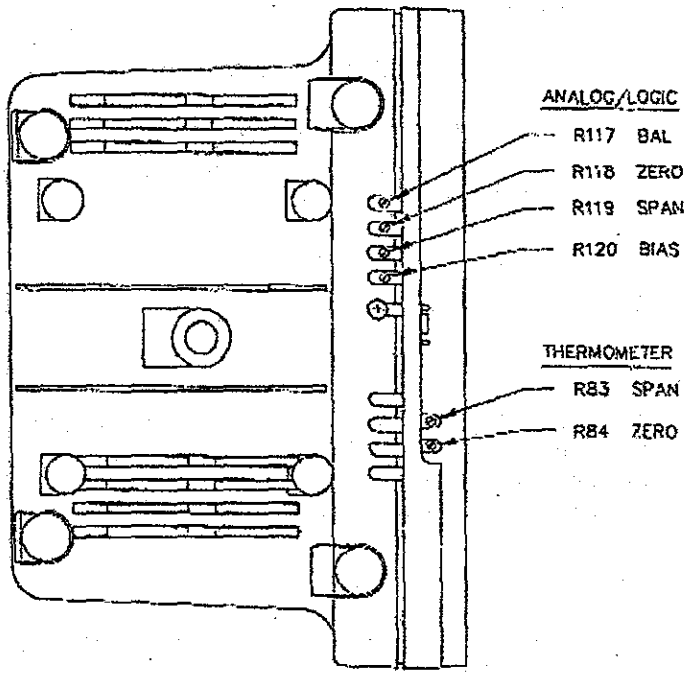


Figure 6-6. Logic/Analog and Display/Thermometer

6.9.7 Overpressure Switch Adjustment (Mechanical)

a. Set the S2 internal DIP switch, no. 6, to the up position. (See figure 6-5.)

b. Note positions of S2 switches, nos. 1 to 4 (referencing table 6-4), then set DIP switch no. 4 in the calibration mode:

1 - Down
2 - Down
3 - Down
4 - Up

c. As shown in figure 6-1, install pressure gauge and pressure source at the cuff nipple using a tee fitting and other fittings as required.

NOTE: Leaky fittings will reduce the reliability of the test.

d. Wrap cuff around a cardboard cylinder (3-5 in. diameter) or use reservoir for providing sufficient air volume.

e. Set the MODE SELECT to MANUAL and the PRES. SELECT to 200.

f. Press the ON/OFF switch to turn the instrument on; the information display will read TESTING, then CAL, indicating that the instrument is in calibration mode.

g. Inflate the instrument and stabilize the pressure at 340 ±5 mmHg on reference gauge and verify that the pressure does not drop at a rate greater than 10 mmHg/min; if it does, there may be excessive air leakage from the cuff or fittings.

h. Slowly increase the pressure and verify that the instrument suddenly and rapidly depressurizes at 390 ±15 mmHg on the reference gauge. If so, the overpressure switch adjustment is correct; go to step k; if not, continue to step i.

i. To adjust the switch:

1. Cycle the ON/OFF switch off, then back on, then re-inflate the system.

2. Turn the adjustment screw until the switch trips at the correct pressure by turning the adjustment screw clockwise to lower the overpressure trip point; turn counterclockwise to raise the overpressure trip point.

NOTE: Each time the overpressure switch is tripped, the instrument is disabled and cannot be inflated; cycle power to clear the failsafe flip-flop.

j. Repeat steps g and h.

k. Press the ON/OFF switch to turn the instrument off, then return S2 DIP switches (nos. 1-4 and 6) back to original configuration.

6.9.8 Deflation Loop Balance Adjustment

a. Connect the DMM ground lead to U41 pin 16 and the positive lead to U503 pin 27 (RPS) on the logic/analog board, then set the DMM to the 20 volt range.

b. Set the internal DIP switch S2 (see figure 6-5), as follows:

1 - Down
2 - Down
3 - Down
4 - Down
6 - Down

NOTE: The instrument must be upright during this adjustment.

c. Install pressure gauge as in section 6.9.6, step d, using a tee fitting and other fittings, as required. (See figure 6-1.)

NOTE: Leaky fittings will reduce the reliability of the test.

d. Wrap cuff around a cardboard cylinder (3-5 in. diameter) or use a reservoir to provide sufficient air volume.

e. Ensure that the MODE SELECT is set to SYSTOLIC.

f. Set the PRES. SELECT to 200.

g. Initiate an inflation cycle by pressing the START/RESET switch; observe the readings on the DMM as the instrument deflates and passes through 200 mmHg and 50 mmHg on the calibration gauge.

h. Repeat the inflation/deflation sequence and adjust R120 (LEAKER BIAS) on the logic/analog board (see figure 6-6) until the average between the minimum and maximum readings on the DMM at 200 and 50 mmHg is 2.5 ±.15 volts.

i. Press the ON/OFF switch to remove power from the instrument, then remove test equipment.

6.9.9 Thermometer Calibration

All references are made to the display/thermometer board unless otherwise noted. This calibration is easily performed with the instrument closed.

NOTE: Calibration of the thermometer is necessary whenever the analog portion (U6, U7, R53 to R72, U13, and C22) on the display/thermometer board is worked on.

6.9.9.1 Water Bath Method (optional)

NOTE: Two circulating hot water baths should be used for calibration. One water bath may be used for calibration, but more time must be allowed for temperature adjustment and stabilization between adjustments.

a. If two circulating hot water baths are used, one must have a temperature of 31.1 ±0.02°C (88 ±0.03°F) and the other 41.1 ±0.01°C (106 ±0.03°F).

   NOTE: U6 will malfunction if R84 is grossly maladjusted. In this case the display would be zeros, there would be no scanning at the output of U6, and there would be no response to any analog input.

b. When the hot water baths have been adjusted to the correct temperature, remove probe from the probe storage well and probe connector from the probe connector socket.

c. Place probe into the 31.1°C (88°F) water bath.

d. Press the DISPLAY TEST switch while inserting probe connector into the connector socket; three digits and a "d" should appear in the TEMPERATURE display. Be sure that the reading is stabilized (digits may have minus (-) signs included.)

e. Verify that the display reads 000d (±1); if it does not, adjust R84 until the display reads 000d (±1).

f. Place the probe into the 41.1°C (106°F) water bath and allow the display to stabilize.

g. Verify that the display reads 900d (±1); if it does not, adjust R83 until the display reads 900d (±1).

h. Verify the accuracy of the adjustments made to R84 and R83 by repeating steps c through g, omitting step d.

i. Press the ON/OFF switch to turn off the instrument.

j. Disconnect the instrument from AC power.

6.9.9.2 Test Fixture Method

a. Press the ON/OFF switch to turn the instrument on.

b. Set the temperature calibration test fixture (IVAC P/N 191815) to 88.

c. Press the DISPLAY TEST switch while inserting the connector from the fixture into the instrument's connector; three digits and a "d" should appear in the temperature display. Be sure that the reading is stabilized. (The digits may have minus (-) sign included.)

d. Verify that the display reads 000d (±1); if it does not, adjust R84 until the display reads 000d (±1). (See figure 6-6.)

NOTE: If the thermometer does not turn on, install and then remove a probe from the probe well.

e. Set the test fixture to 106 and verify that the display reads 900d (±1); if it does not, adjust R83 until the display reads 900d (±1).

f. Verify the accuracy of adjustments made to R84 and R83 by repeating steps b, d, and e.

g. Press the ON/OFF switch to turn the instrument off.

6.9.10 Real-Time Clock (CIM option only)

The real-time clock must be reset any time battery power is lost. SET TIME will override all other messages in the information display if the clock requires setting.

a. Select the clock mode by simultaneously pressing and holding contact between two locations: just to the left of the 125 and 150 PRES. SELECT switch and just to the left of the 5 and 15 MODE SELECT switch. (Contact will be verified by a short beep.)

b. Continue to hold contact at both locations until both the PRES. SELECT and MODE SELECT indicators go out, then release the contact pressure.

c. If the information display reads SET TIME, press the START/RESET switch; the information display will now read the time of day as follows:

in 12 hour format: HH:MM AM (or PM)
in 24 hour format: HH:MM:SS

(HH = hours, MM = minutes and SS = seconds)

d. To change between 12 and 24 hour format, press the START/RESET switch.

e. To set time:

1. Press the DISPLAY TEST switch once:

2. In the 12-hour format, AM (or PM) will flash. AM or PM can be selected by pressing the START/RESET switch; each press will alternate the AM/PM indication.

3. In the 24-hour format the seconds display will flash; the seconds may now be set by pressing the START/RESET switch.

f. Press the DISPLAY TEST switch, the hours display will now flash; press the START/RESET switch once for each hour to be changed.

g. Press the DISPLAY TEST switch, the minutes 10's display will now flash; press the START/RESET switch once for each ten minutes to be changed.

h. Press the DISPLAY TEST switch, the minutes 1's display will now flash; press the START/RESET switch once for each minute to be changed.

i. Press the DISPLAY TEST switch, the information display will now display the date as follows:

MM-DD-YY

(MM = Month, DD = Day, YY = Year)

The months display will be flashing; press the START/RESET switch once for each month to be changed.

j. Press the DISPLAY TEST switch, the days display will now flash; press the START/RESET switch once for each day to be changed.

k. Press the DISPLAY TEST switch, the year 10's display will now flash; press the START/RESET switch once for each ten years to be changed.

l. Press the DISPLAY TEST switch, the year 1's display will now flash; press the START/STOP switch once for each year to be changed.

m. Press the DISPLAY TEST switch, the time display will return to the information display; the clock IC (U29) will remain set unless power is lost to the logic/analog board. (If the battery is disconnected for any reason, the time and date must be reset.)

n. To exit the clock mode, actuate either the MODE SELECT or PRES. SELECT switch. (The clock setting mode can be exited at any state in this manner.

o. After exiting the clock mode, ensure that the mode and pressure settings are correct.

6.10 CALIBRATION VERIFICATION

Calibration verification ensures that the instrument blood pressure and thermometer measurement systems have been correctly calibrated and operate accurately before return to patient use.

6.10.1 Blood Pressure Calibration Verification

a. Note positions of internal DIP switch S2 (refer to figure 6-5 and table 6-4), then set S2 DIP switch in the calibration configuration mode:

1 - Down
2 - Down
3 - Down
4 - Up

b. As shown in figure 6-1, install pressure gauge and pressure source at the cuff nipple using a tee fitting and other fittings as required.

NOTE: Leaky fittings will reduce the reliability of the test.

c. Wrap cuff around a cylinder (3-5 in. diameter) or use a reservoir to provide sufficient air volume.

d. Press the ON/OFF switch to turn the instrument on; the information display will read TESTING, then CAL, indicating that the instrument is in calibration mode, and the SYSTOLIC display will read 000, indicating that zero pressure is applied.

e. Set the MODE SELECT to MANUAL and PRES. SELECT as required. (See step f.)

f. Apply test pressures in the range as required below and verify that the SYSTOLIC display matches the reading on the external gauge, making allowance for error tolerances of the external gauge. (See table 6-7.)

Table 6-7. Test Pressures

PRES. SELECT	Pressure* Applied	SYSTOLIC Reading	DIASTOLIC Reading
200	301 ±6	300-302	108 ±60
150	251 ±3	250-252	108 ±40
100	151 ±2	150-152	108 ±20

*Adjust pressure until SYSTOLIC fluctuates between desired readings, then check applied pressure for correct value.

NOTE: The instrument has a resolution of 2 mmHg, and will read out only to the nearest even number in the SYSTOLIC display.

g. If the readings are not acceptable, refer to the recalibration as described in section 6.9.4.

NOTE: This procedure does not test the cuff, which may be leaky.

h. Before returning the instrument to clinical use, reset internal DIP switch S2 to the original operating configuration.

i. Reinstall the test connector cover and rear pneumatic port seal.

6.10.2 Thermometer Calibration Verification

a. Insert thermometer tester (model 828A) into the probe connector socket. Turn on the instrument if not already turned on.

b. Set the NORMAL/MONITOR mode switch to MONITOR, the S2 internal DIP switch no. 5 (see figure 6-5) to the up (°F) position, and verify that the temperature display flashes 98.6°F (±0.2°F).

NOTES:

1) If the thermometer does not turn on, install and then remove a probe from the probe storage well.

2) For °C, set the internal DIP switch S2 no. 5 to the down position.

c. Set the NORMAL/MONITOR mode switch to NORMAL, verify that the display reads 98.6°F (±0.2°F), and that only the F flashes on and off.

d. Remove the thermometer tester from the instrument and return the DIP switch to the °C setting, if necessary.

6.11 ELECTRICAL SAFETY TESTS

6.11.1 Ground Current Leakage Test

Use a DYNATECH 232B or equivalent tester to measure the ground current leakage. Refer to the electrical safety tester's operation manual for the proper measurement technique. Leakage must be less than or equal to 15 μamps for normal and reversed line polarity for 120 VAC input.

6.11.2 Ground Resistance Testing

Use a DYNATECH 232B or equivalent equipment to measure resistance from the ground pin on the AC power plug to the chassis (stand mounting threads on bottom of the instrument). Refer to the electrical safety tester's operation manuals for the proper measurement technique. Resistance should be less than or equal to 0.1Ω at 25A, 50 to 60 Hz AC rms.

6.12 FINAL TESTS

Set up the instrument as follows:

a. Connect the instrument to AC power.

b. Press the ON/OFF switch and verify that the SYSTOLIC, DIASTOLIC, and PULSE displays show all 8's and TESTING appears in information display for 3 ±1 seconds. The SYSTOLIC, DIASTOLIC, and PULSE displays should go blank. A mode message accompanied by 2 beeps replaces TESTING.

6.12.1 Battery Operation Test

a. Set the MODE SELECT to MANUAL, then disconnect the instrument from AC power.

b. Verify that the green charge indicator goes off and that after about 20 seconds the information display changes from a steady MANUAL to a flashing STANDBY message.

6.12.2 Display Test

a. Install a temperature probe on the instrument, then reconnect instrument to AC power.

b. Press the DISPLAY TEST switch and verify that all segments of the SYSTOLIC, DIASTOLIC, PULSE, and TEMPERATURE displays light, and that the information display alternates between capital O's and asterisks, and that all four of the pressure indicators and all eight of the mode indicators light.

c. Press and hold the DISPLAY TEST switch as you press and hold the START/RESET switch, then release both switches; verify that each numeric digit (except the TEMPERATURE display) lights sequentially, with a number or character that corresponds to its position in the sequence. The number or character must be as stated in table 6-8.

Table 6-8. Display Test Sequences

1. SYSTOLIC

   1's digit - 0
   10's digit - 1
   100's digit - 2

2. DIASTOLIC

   1's digit - 3
   10's digit - 4
   100's digit - 5

3. PULSE

   1's digit - 9
   10's digit - lower 4 segments of an 8
   100's digit - upper 4 segments of an 8

5. Similarly, the segments of the information display will light one at a time, right to left, with the numerical sequence 0 to 7. Each character or number must remain displayed for about 0.6 seconds.

6. The TEMPERATURE display will continuously display 88888.

   NOTE: A probe must be installed in the probe connector and probe storage well.

7. The pressure and mode indicators are all lit.

d. Press the DISPLAY TEST switch again and verify that:

   1. All numeric displays (except TEMPERATURE) cycle simultaneously through the digits 0 to 9.

   2. The information display cycles through the characters that correspond to the hexadecimal codes 20 to 5F. (See figure 6-7.)

   3. The TEMPERATURE display continuously displays 88888.

      NOTE: A probe must be installed in the probe connector and probe storage well.

   4. The pressure and mode indicators are all lit.

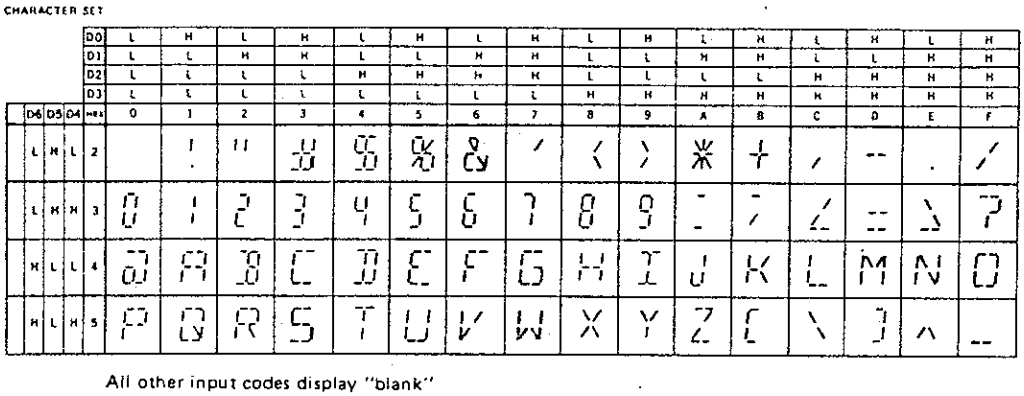


Figure 6-7. Hexadecimal Code Characters

e. Press the DISPLAY TEST switch again and verify that:

1. The TEMPERATURE display remains lit with all 8's and the other numeric displays are blank.

2. The pressure and mode indicators are all lit.

3. The current software revision level message REV X.XX (where X.XX represents the level) appears in the information display.

f. Press the DISPLAY TEST switch again and verify that the instrument sounds two audible tones and displays the mode setting in the information display.

6.12.3 Blood Pressure Measurement Test

a. Connect the instrument to AC power and verify that the green charge indicator lights.

b. Press the ON/OFF switch and verify that TESTING appears in the information display briefly, accompanied by two audible tones, then the mode setting.

NOTE: TESTING will appear in the information display each time power is applied to the instrument.

c. Set the PRES. SELECT to 150 and the MODE SELECT to MANUAL.

d. Plug the cuff connector into the cuff connector receptacle.

e. Place the cuff on a person's arm, following the cuff placement instructions provided in the VITAL•CHECK instrument - Model 4200 Directions For Use.

f. Press the START/RESET switch and verify that:

1. The initial goal pressure (150 mmHg) flashes.

2. After the pumping stops, the instrument pauses while it checks for complete occlusion (no Korotkoff sounds) and air leaks. The cuff pressure is then displayed on the information display and the cuff begins to deflate.

NOTES:

1) If two Korotkoff sounds are detected during the first 3.5 seconds of deflation, the instrument will repump by 25 mmHg more than the previous inflation pressure and restart deflation.

2) If the person's Korotkoff sounds are too weak (due to cuff misalignment or greater-than-normal adipose tissue) the instrument may not be able to compute the blood pressure (BP) utilizing the auscultatory algorithm, thus it will fall back on the oscillometric algorithm. If this is the case, the BP READY message will be replaced by BP*READY. The instrument should be retested using another person's arm (ensure that the cuff is correctly positioned) to verify the auscultatory algorithm.

3. An asterisk (*) flashes on the information display as the instrument detects Korotkoff sounds during deflation.

4. Controlled deflation continues until the diastolic pressure is detected, at which point the cuff pressure is immediately dumped to zero and the measurement is completed. The instrument then sounds an audible tone and displays the systolic BP, diastolic BP, and PULSE. The information display alternates between BP READY and MANUAL five times, then displays MANUAL.

NOTE: The results of this test are dependent upon the characteristics of the individual whose blood pressure is being monitored. If the instrument does not perform as specified, repeat the test on another person.

g. The instrument is in need of repair if it alarms FIX ME or fails to operate as indicated.

6.12.4 MODE Function Test

a. With the instrument turned on, set the MODE SELECT to MANUAL.

b. Cycle the ON/OFF switch off and then on, and verify that TESTING appears in the information display, then MANUAL.

c. Set the MODE SELECT to MEMORY and verify that MEMORY appears in the information display.

d. Set the MODE SELECT to SYSTOLIC and verify that SYSTOLIC appears in the information display.

e. Set the MODE SELECT to 1 and verify that the display shows 1 MIN., then counts down from 1 minute.

f. Set the MODE SELECT back to SYSTOLIC for 4 seconds, then set it at 2.5 and verify that the display shows 2.5 MIN., then counts down from 2.5 minutes.

g. Set the MODE SELECT back to SYSTOLIC for 4 seconds, then set it at 5 and verify that the display shows 5 MIN., then counts down from 5 minutes.

h. Set the MODE SELECT back to SYSTOLIC for 4 seconds, then set it at 15 and verify that the display shows 15 MIN., then counts down from 15 minutes.

i. Set the MODE SELECT back to SYSTOLIC for 4 seconds, then set it at 30 and verify that the display shows 30 MIN., then counts down from 30 minutes.

6.12.5 Pressure Function and Abort (RESET) Test

a. Set the MODE SELECT to MANUAL.

b. Set the PRES. SELECT to 100.

NOTE: A BP cuff is necessary for this test. It must be installed on an arm as per Chapter Three, FUNCTIONAL DESCRIPTION, or mounted on a cylinder (3-5 in. diameter).

c. Press the START/RESET switch to initiate an inflation cycle and verify that 100 flashes in the information display.

d. Immediately press the START/RESET switch again and verify that the instrument stops, and that MANUAL appears in the information display accompanied by two audible tones.

e. Set the PRES. SELECT to 125.

f. Press the START/RESET switch to initiate an inflation cycle and verify that 125 flashes in the information display.

g. Immediately press the START/RESET switch again to stop the instrument, as in step d above.

h. Set the PRES. SELECT to 150.

i. Press the START/RESET switch to initiate an inflation cycle and verify that 150 flashes in the information display.

j. Immediately press the START/RESET switch again to stop the instrument, as in step d in this section.

k. Set the PRES. SELECT to 200.

l. Press the START/RESET switch to initiate an inflation cycle and verify that 200 flashes in the information display.

m. Immediately press the START/RESET switch again to stop the instrument, as in step d in this section.

6.13 CIM II INTERFACE FUNCTIONAL TEST (Model 4200C Only)

There is no preventative maintenance on the solid-state components contained in the CIM.

For information on the proper use and care of the CIM in connection with this instrument, refer to the IVAC CIM Service Manual (part number 128696), and accompanying service bulletins.

To check the CIM, the interface wiring, and the computer system, use the following procedure.

a. Ensure that the computer connector on the Model 4200 instrument back panel is connected to the appropriate cable.

b. Turn on the computer and ensure that it is set up to receive data.

c. Take a blood pressure and compare the readout from the instrument display to the data received by the computer, and ensure that the computer correctly received the data.

CHAPTER SEVEN - PERIODIC INSPECTIONS

7.0 INTRODUCTION

This chapter describes the periodic inspections necessary to ensure the VITAL•CHECK instrument - Model 4200 continues to operate properly.

Periodic inspections are available through IVAC to those customers located within the on-site service territory of an IVAC authorized service repair organization. Customers within the United States may call IVAC's toll-free Corporate Customer Service Line (800) 482-4822 for information.

7.1 PERIODIC/PREVENTATIVE MAINTENANCE INSPECTIONS

Periodic/preventative maintenance inspections consist of the following inspection procedures and in service bulletins which may supplement the service manual. These inspections must be performed upon receipt of the instrument and at least as often as the intervals indicated. (See table 7-1.) Under heavy usage, more frequent inspections may be indicated.

The periodic/preventative maintenance inspections must be performed in accordance with IVAC requirements and guidelines, and are also intended to complement the intent of JCAHO requirements.

WARNING: Do not perform this checkout while using the instrument on a patient.

If the instrument does not pass a test/inspection, then servicing is required. Do not place the instrument back in use until all tests/inspections pass.

Table 7-1. Periodic/Preventative Maintenance Inspections

Procedure	Frequency
Perform Case and Power Cord Inspection	6 Months
Perform Umbilical Tubing and Cuff Connectors Inspection	6 Months
Perform Electrical Safety Tests	6 Months
Perform Display Test	6 Months
Perform Battery Operation Test	6 Months
Check Blood Pressure Calibration Verification	6 Months
Check Instrument Stand Assembly (Model 1042)	6 Months
Perform Pump Assembly Lubrication	12 Months
Perform Functional Checkout - Regular Inspections	6 Months
Check CIM II Interface - Functional Test (Model 4200C only)	6 Months

7.2 CASE AND POWER CORD INSPECTION

Verify the following:

a. Instrument case and hardware are intact.

b. Silk screening, decals and labels are intact.

c. There are no cuts or gross deformities in the cord.

d. Integrity of hospital grade power plug.

e. Undamaged circuit breaker.

7.3 UMBILICAL TUBING AND CUFF CONNECTORS INSPECTION

Verify the following:

a. There are no cuts or gross deformities in tubing.

b. There are no cracks or cuts in cuffs.

7.4 ELECTRICAL SAFETY TESTS

Refer to Chapter Six, CORRECTIVE MAINTENANCE (section 6.11).

7.5 DISPLAY TEST

Refer to Chapter Six, CORRECTIVE MAINTENANCE (section 6.12.2).

7.6 BATTERY OPERATION TEST

Refer to Chapter Six, CORRECTIVE MAINTENANCE (section 6.12.1).

7.7 CHECK BLOOD PRESSURE CALIBRATION VERIFICATION

Refer to Chapter Six, CORRECTIVE MAINTENANCE (section 6.10.1).

7.8 CHECK INSTRUMENT STAND ASSEMBLY (Model 1042)

Verify the following:

a. Screws are tight and intact.

b. Casters move with ease.

c. Assembly parts are intact.

7.9 PUMP ASSEMBLY LUBRICATION (Figure 8-13)

Case Disassembly

a. Place the instrument facedown on a soft surface so as not to scratch the front panel.

b. Using a Phillips (no. 1) screwdriver, remove the 4 screws securing the front and rear cases.

c. Place the instrument upright on a static-protected surface and slide the front case forward and rotate it forward onto its face.

d. Disconnect pump assembly harness from the transition board.

e. Remove the 3 thread-forming screws holding the motor bracket to the manifold using a Phillips (no. 1) screwdriver, then remove pump assembly.

f. Slide the piston off eccentric drive and clean piston hole and eccentric shaft with a clean cotton swab or lint-free cloth.

Lubrication

a. Coat the eccentric shaft and piston hole with a small dab of pump lubricant (Dupont - Kyrtox GPL-205), then slide the piston onto eccentric shaft.

b. Ensure that piston face with 4 small depressions is towards the motor.

Case Reassembly

a. Rotate eccentric and piston to the full up position so that diaphragm is against motor bracket.

b. Align pump assembly with manifold mounting holes, then seat into pocket.

c. Install 3 thread-forming screws, being careful not to overtighten.

d. Attach pump harness to transition board.

e. With the instrument in an upright position, slide the front case backward and rotate it backward.

f. Using a Phillips (no. 1) screwdriver, install the 4 screws which secure the front and rear cases.

7.10 FUNCTIONAL CHECKOUT - REGULAR INSPECTIONS

Refer to Chapter Two, OPERATION (section 2.7).

7.11 CHECK CIM II INTERFACE - FUNCTIONAL TEST (Model 4200C only)

Refer to Chapter Six, CORRECTIVE MAINTENANCE (section 6.13).

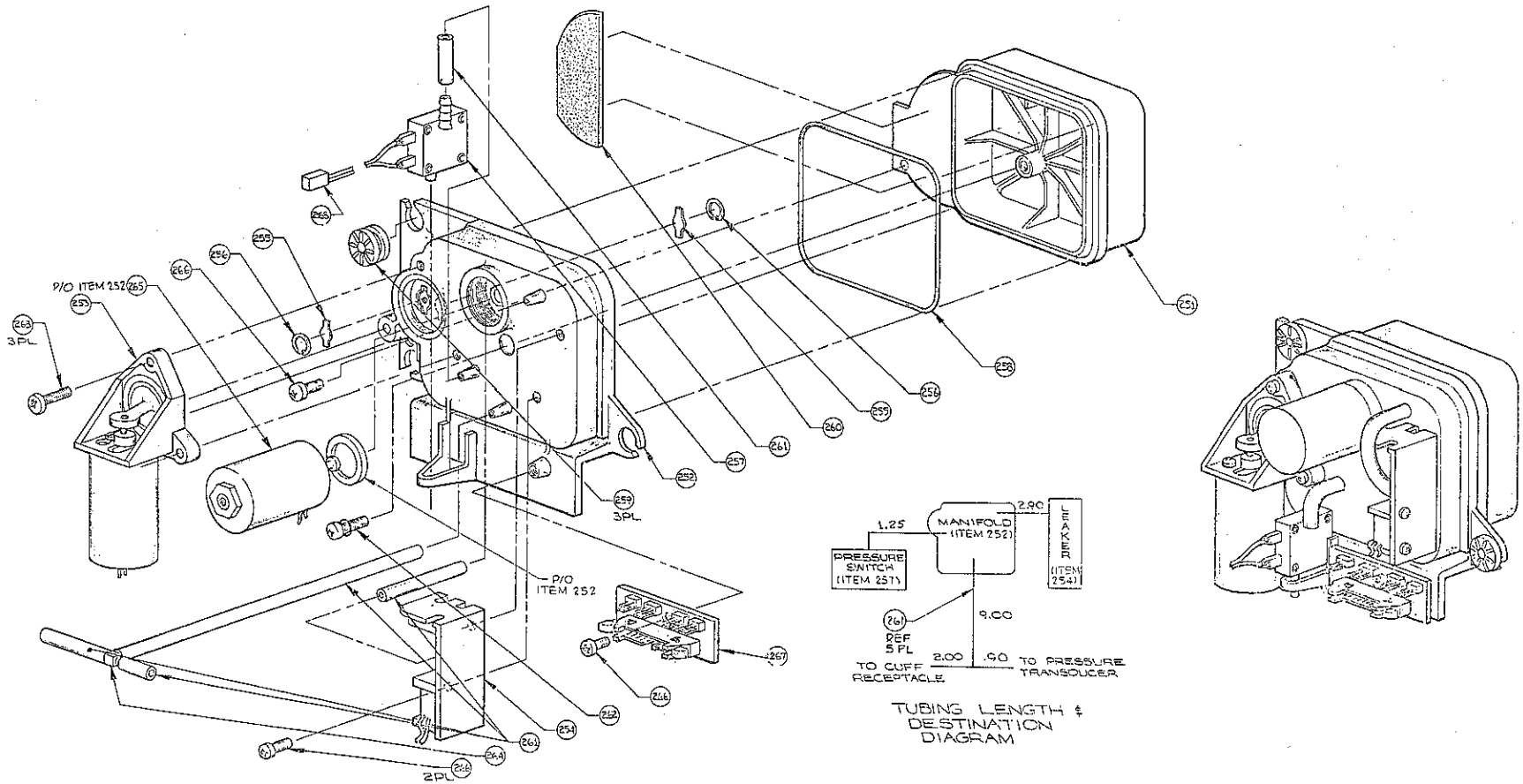


Figure 8-7. Pneumatic Assembly

CHAPTER EIGHT - ILLUSTRATED PARTS BREAKDOWN

8.0 INTRODUCTION

The illustrated parts breakdown for the IVAC VITAL•CHECK instrument - Model 4200 consists of the complete system divided into assemblies, subassemblies, and individual component parts.

8.1 ILLUSTRATIONS

The following paragraphs describe exploded view and board assembly illustrations.

8.1.1 Exploded View Illustrations

Exploded view illustrations serve as visual aids for identifying the component parts of each assembly. Index numbers used on the illustrations, when used in conjunction with the appropriate parts list, identify each part shown.

8.1.2 Board Assembly Illustrations

Board assembly drawings illustrate the board layout, identifying the location of each component. The accompanying parts list describes each component in detail.

8.2 PARTS LISTS

The parts lists provide part numbers and descriptions for parts or subassemblies which are identified on the drawings, and which may require replacement when the instrument is serviced or repaired. Some parts can only be ordered as part of a subassembly (i.e., dump valve). In the case of electronic components on PW board, reference designations are supplied (rather than index numbers) as an aid to locating the component in the circuit (PW boards are not depicted as exploded views). Paragraphs 8.2.1 through 8.2.5 explain the contents of the parts lists in further detail.

8.2.1 Item and Index Number

This column lists the number of the item referenced by the parts list, and provides index numbers of assemblies/components identified on the drawing. The index numbers on an illustration correspond to the same number appearing in the parts list.

8.2.2 Part Number

The number appearing in this column is an IVAC-assigned part number in one of two categories:

a. IVAC designed and built: 100000 series numbers.

b. IVAC procured but built by (and available from) an outside vendor: 300000 series numbers.

All 300000 series numbers may be purchased either from IVAC or from the original manufacturer/distributor.

8.2.3 Description

This column of the parts list provides descriptive data--type, size, color, etc.--required to identify the part when ordering or replacing it. Abbreviations used are defined in table 1-1. Commercially procurable parts (except for electronic components) are listed as COML. These parts, in addition to all electronic components with a 300000 series part number, are available commercially.

8.2.4 Quantity

This column indicates the total number (quantity) of each part used within the assembly.

8.2.5 Issue Unit of Measure

This column indicates the unit of measure for each given part number.

8.2.6 Reference Designation

Each electronic component assigned a circuit symbol has that reference designation listed in this column. Used in conjunction with the schematic diagrams and the descriptions in the parts lists, the reference designation numbers (which also appear on the board assembly drawings to identify each component's location), provide data required to troubleshoot or repair/replace any component.

8.3 ORDERING PARTS

Parts can be ordered by writing or calling the IVAC Service Department at the following address/phone number. When requesting a part, please provide the following information:

a. Instrument name.

b. Instrument model number.

c. The six-digit part number.

d. Description of the part as it appears in the parts list.

Contact: IVAC Corporation
10300 Campus Point Drive
San Diego, CA 92121-1579
ATTN: Customer Service
(800) 482-4822

NOTES:

1. LABELS SHALL BE POSITIONED AS SHOWN USING APPLICABLE DIMENSIONS. LABELS SHALL BE STRAIGHT, CENTERED, AND SHALL NOT OVERHANG EDGES OR OVERLAP OTHER LABELS.

2. IF THE BAR CODE SERIAL NUMBER LABEL(ITEM 603) IS DAMAGED OR UNAVAILABLE, TYPE THE MODEL AND SERIAL NUMBER ON THE SERIAL NUMBER REPLACEMENT LABEL(ITEM 613).

3. LABEL(S) TO ALIGN WITH THIS EDGE.

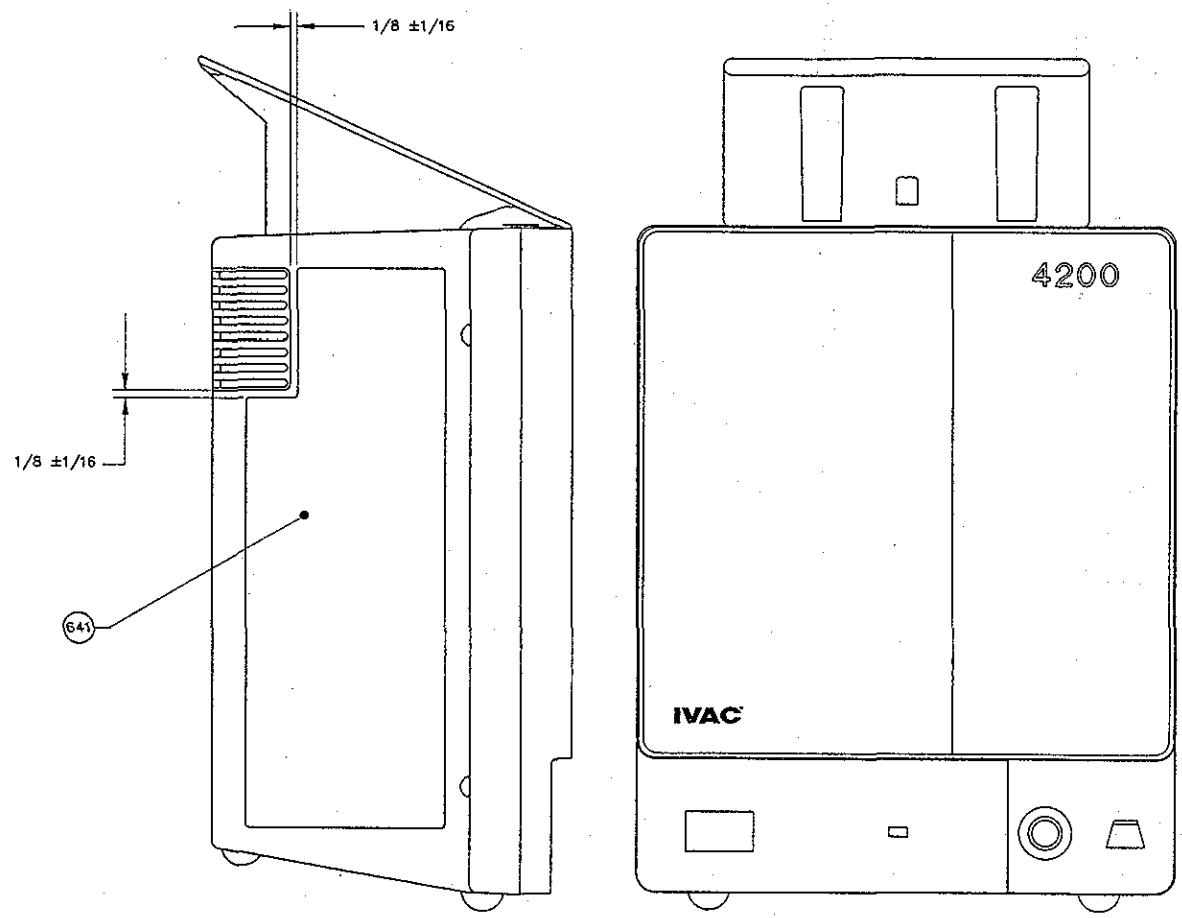


Figure 8-1A. Label/Literature

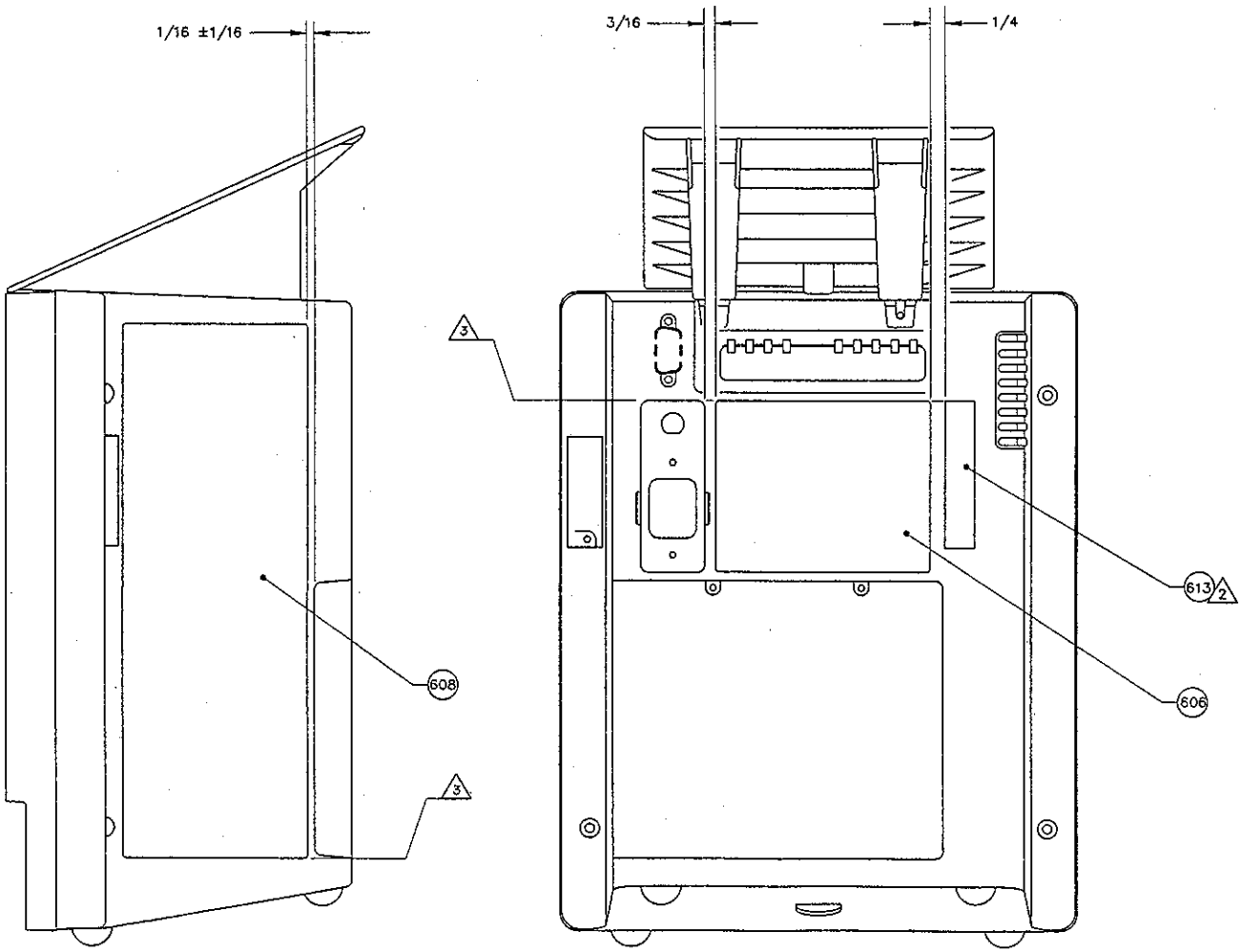


Figure 8-1B. Label/Literature

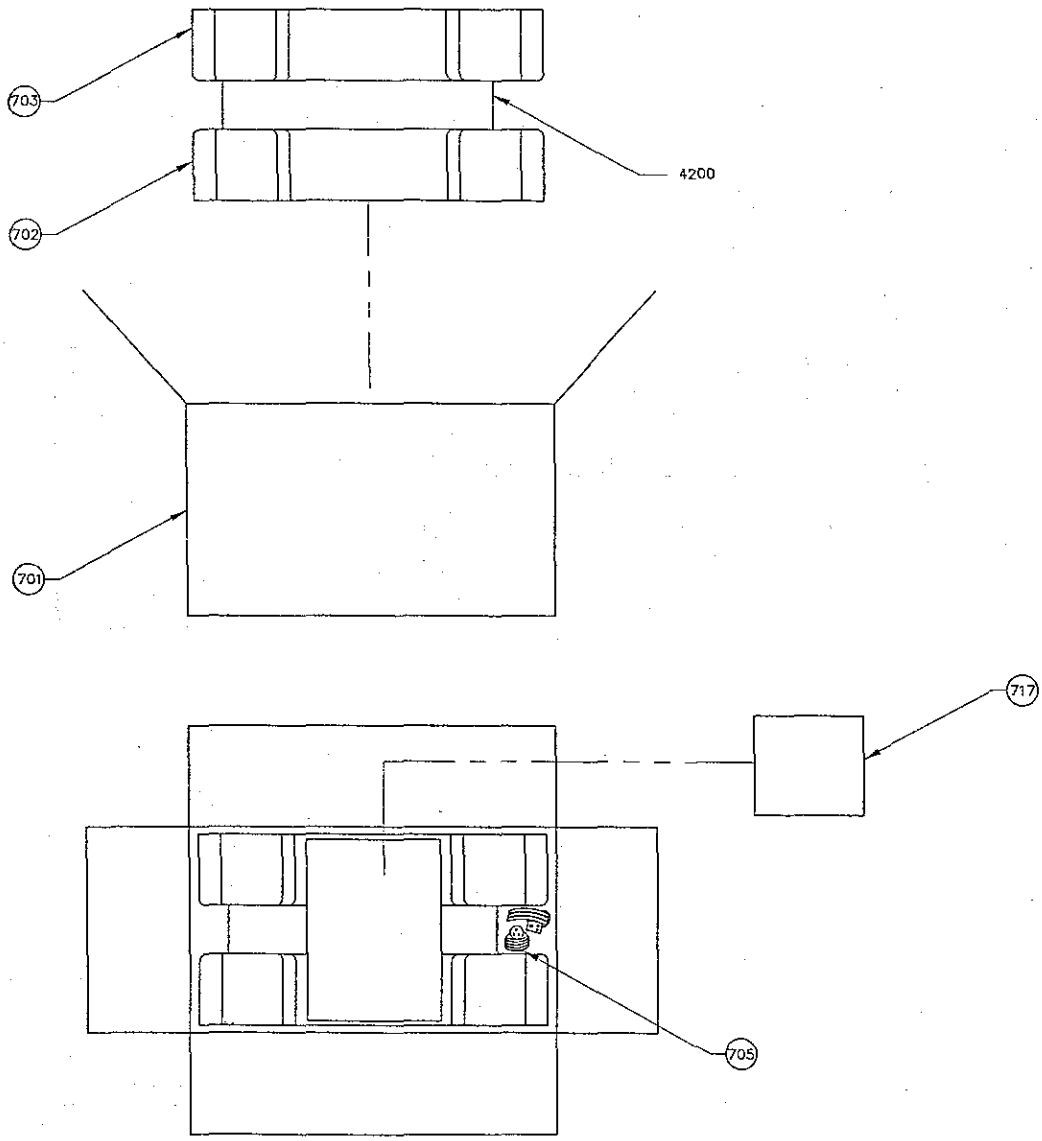


Figure 8-2. Packaging Assembly

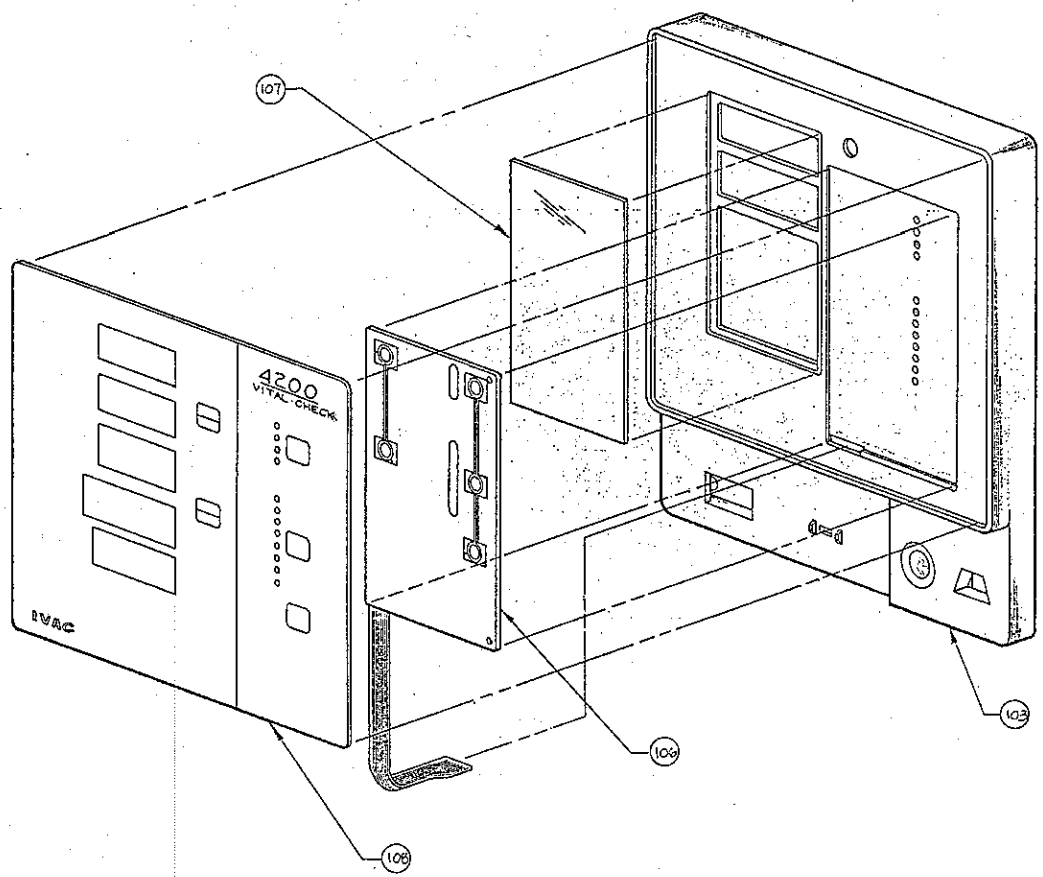


Figure 8-3. Front Case Kit (Item 11)

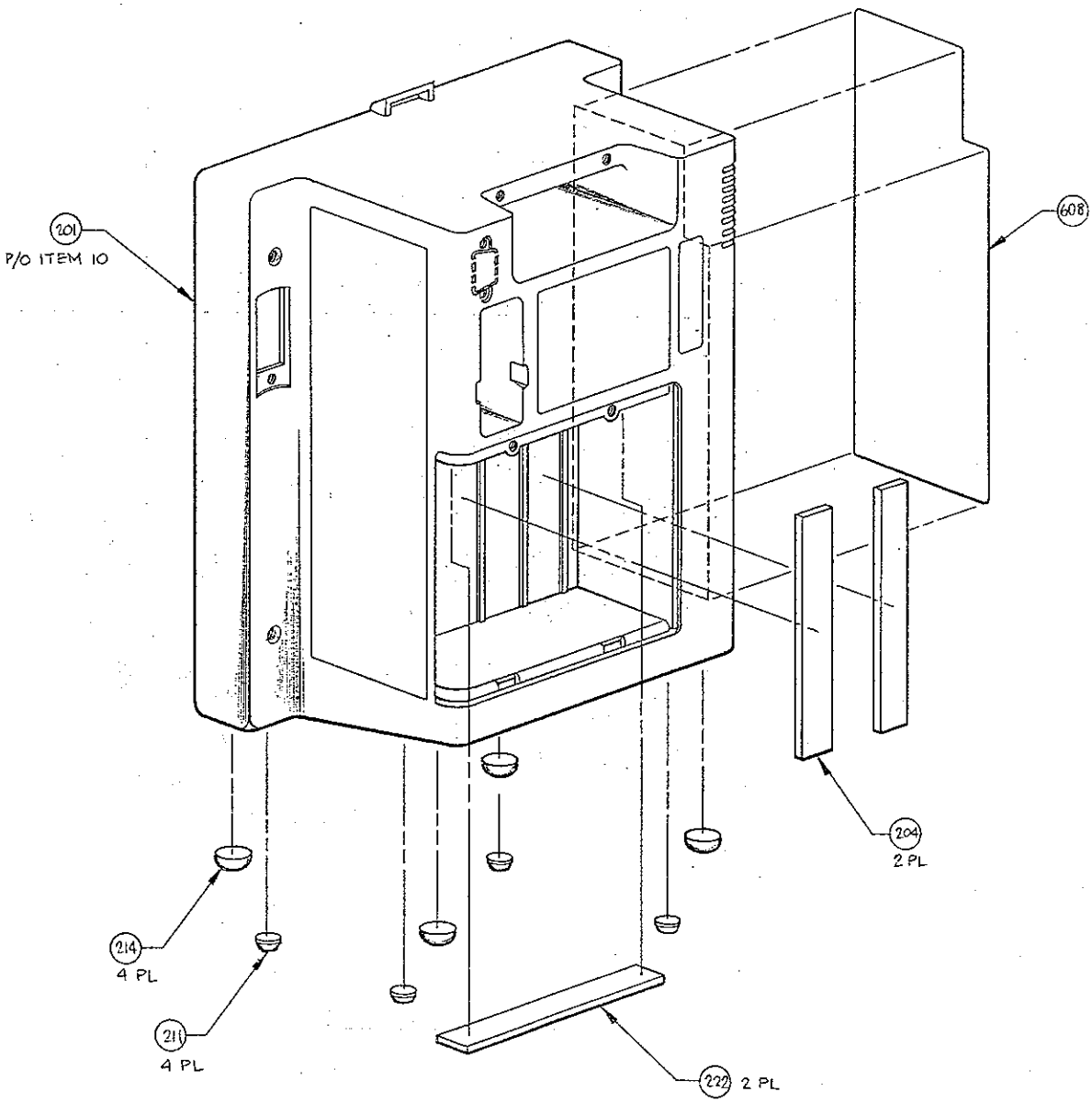


Figure 8-4. Rear Case Kit (Item 10)

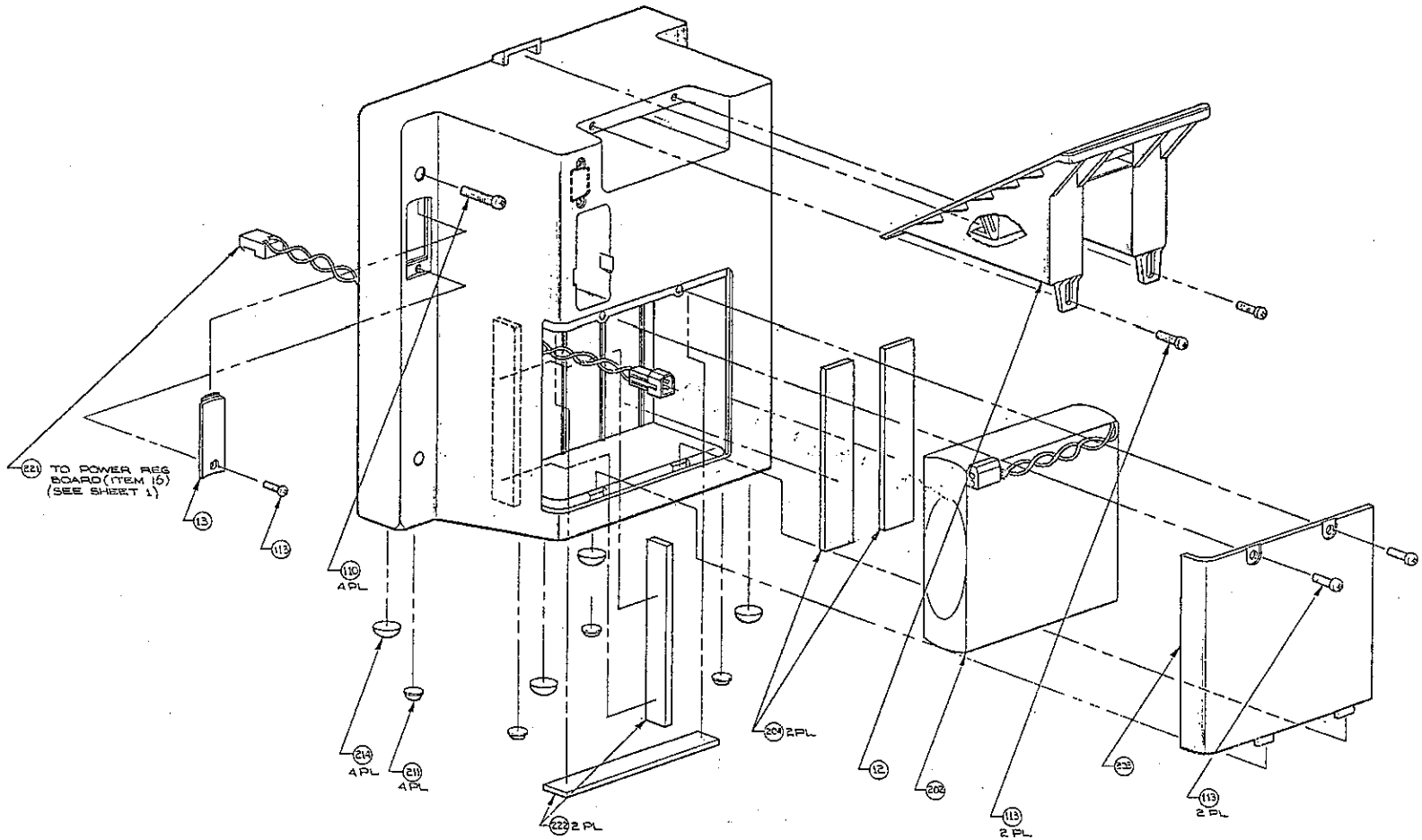


Figure 8-5A. Final Instrument Assembly (Item 220)

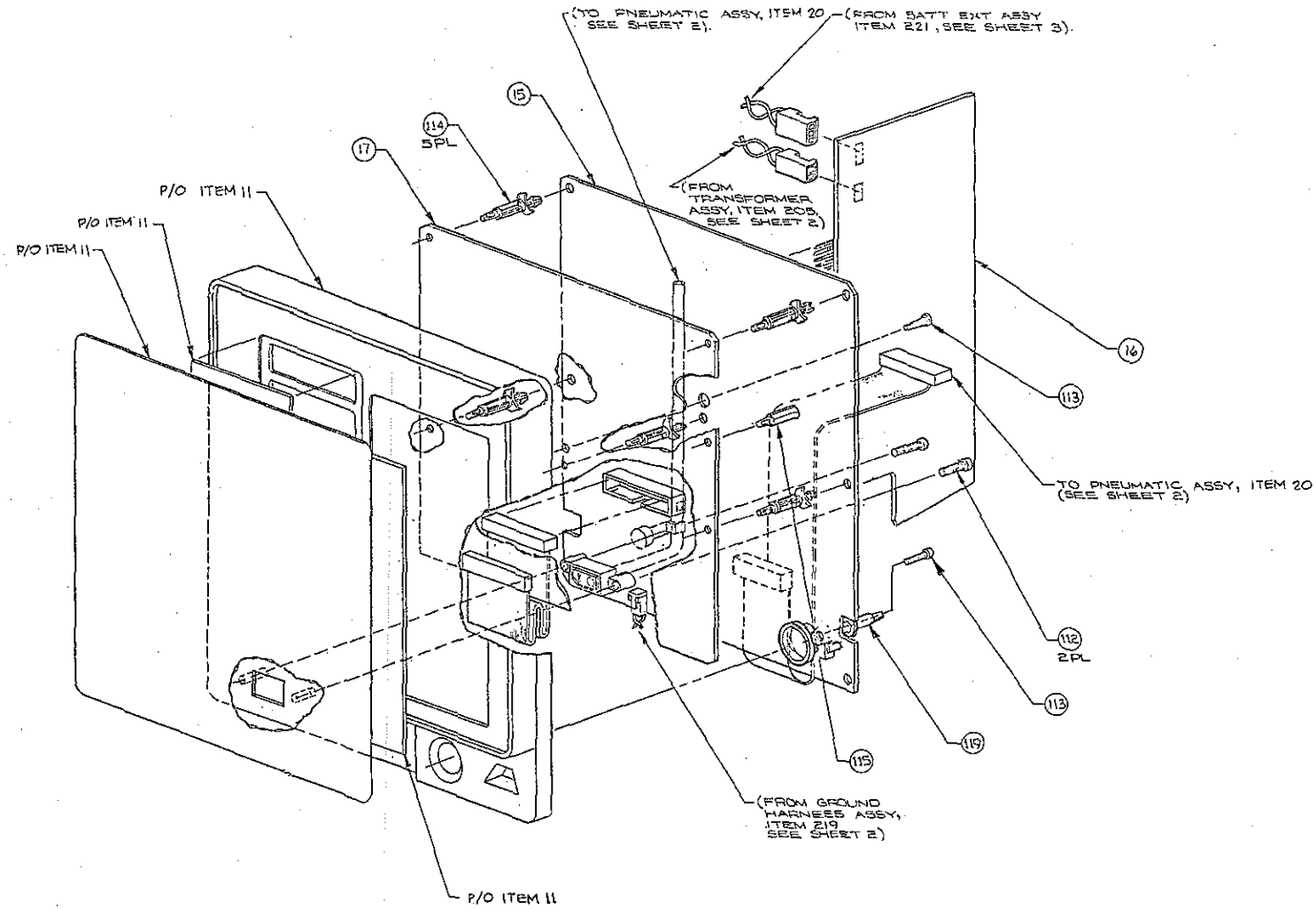


Figure 8-5B. Final Instrument Assembly

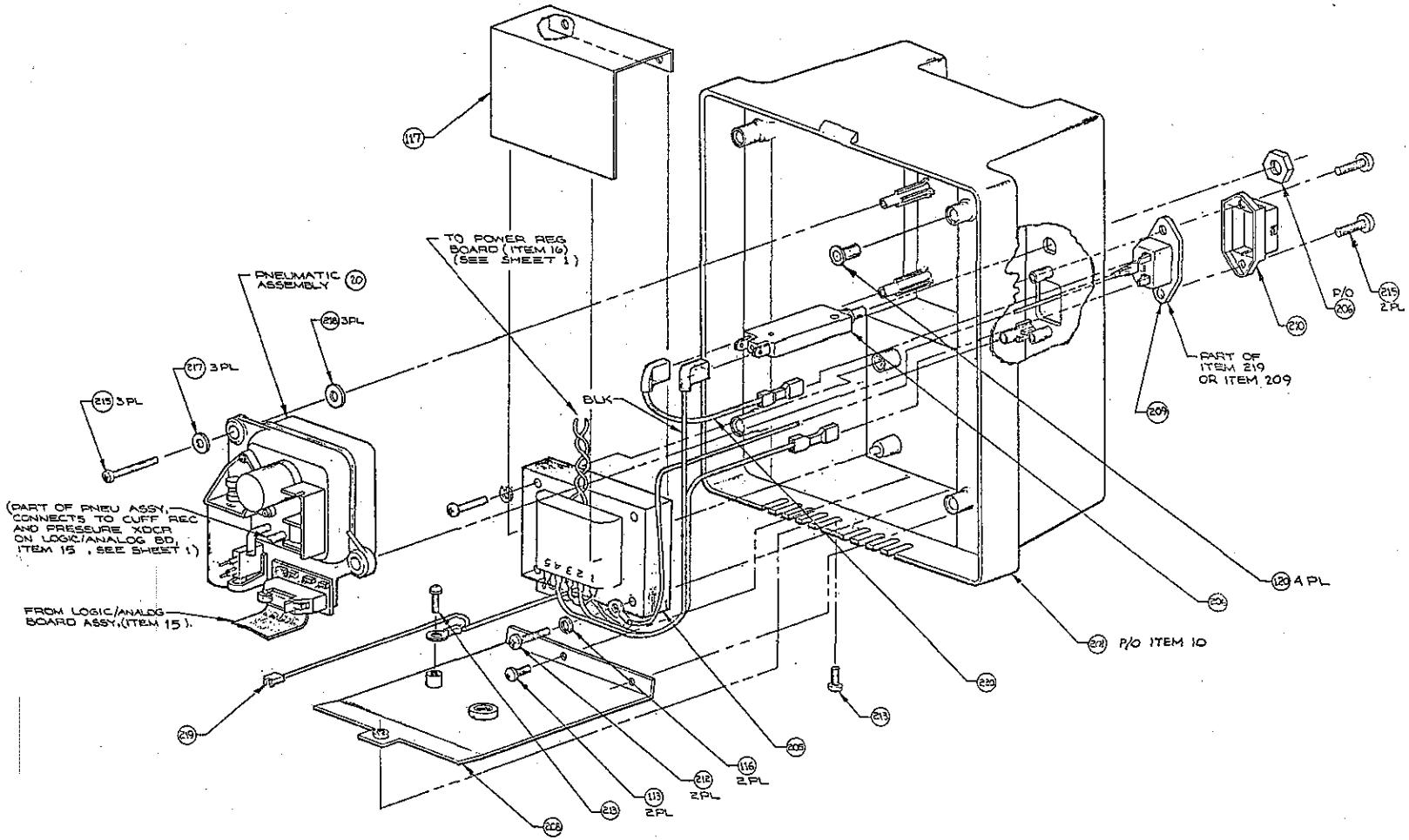

TO POWER REG BOARD (ITEM 16) (SEE SHEET 1)
PNEUMATIC ASSEMBLY
3 PL
3 PL
3 PL
BLK
(PART OF PNEU ASSY, CONNECTS TO CUFF REG AND PRESSURE XDCR ON LOGIC/ANALOG BD, ITEM 15 , SEE SHEET 1)
FROM LOGIC/ANALOG BOARD ASSY.(ITEM 15).
PART OF ITEM 219 OR ITEM 209
P/O ITEM 10
4 PL
2 PL
2 PL
2 PL
1 2 3 4 5

Figure 8-5C. Final Instrument Assembly

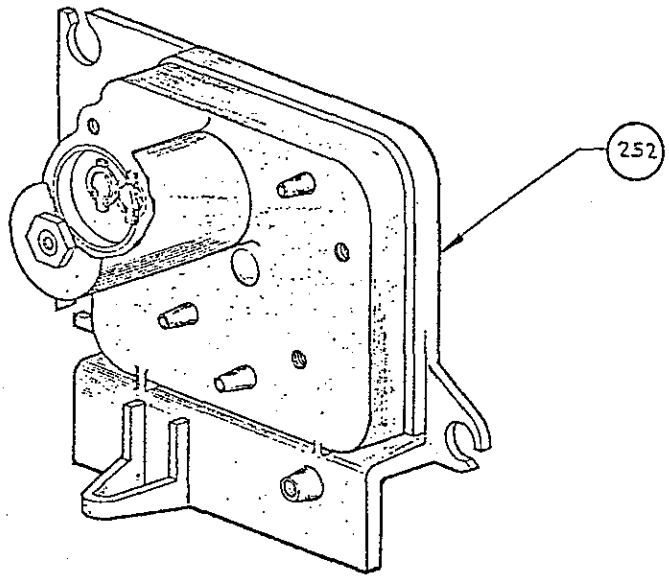


Figure 8-6. Manifold Assembly

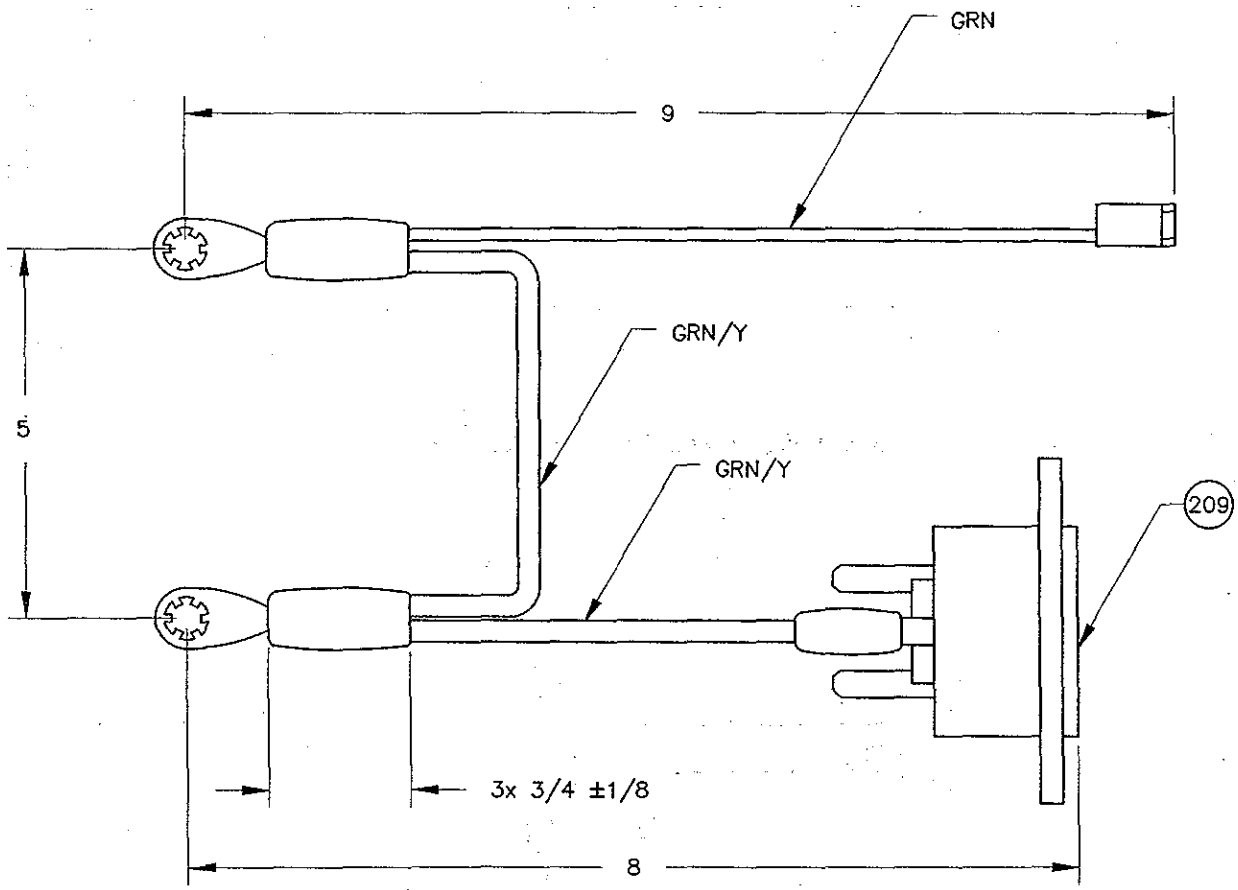


Figure 8-8. Ground Harness Assembly (Item 219)

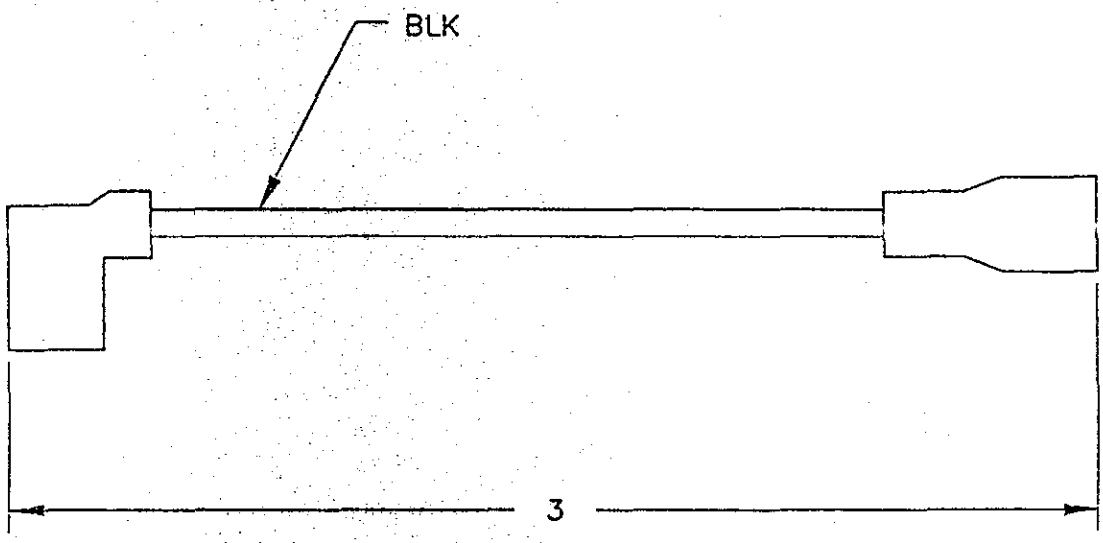


Figure 8-9. Power Harness Assembly (Item 220)

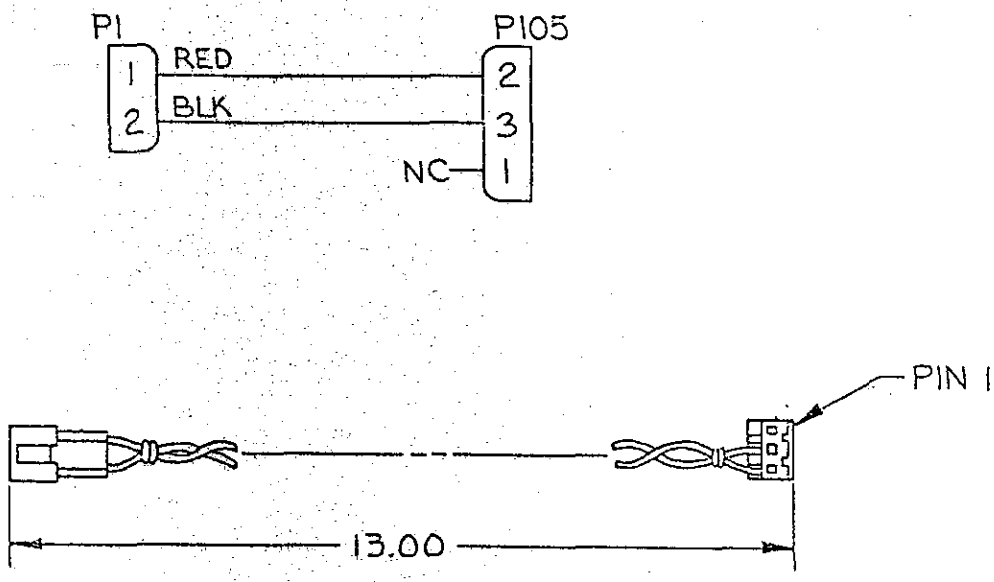


Figure 8-10. Battery Extension Harness Assembly (Item 221)

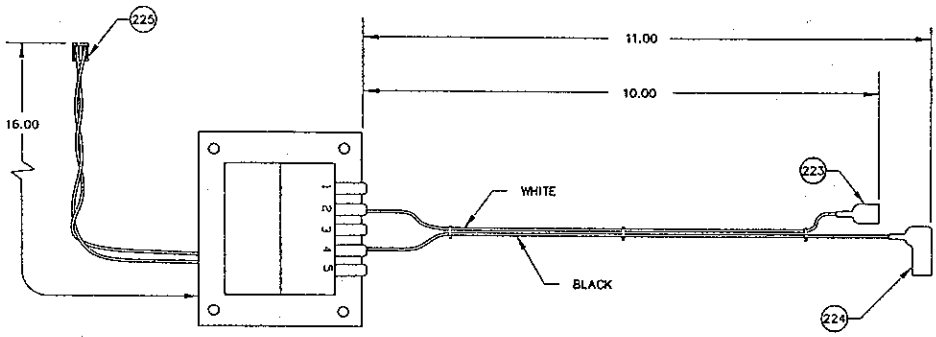


Figure 8-11. Transformer Assembly (Item 205)

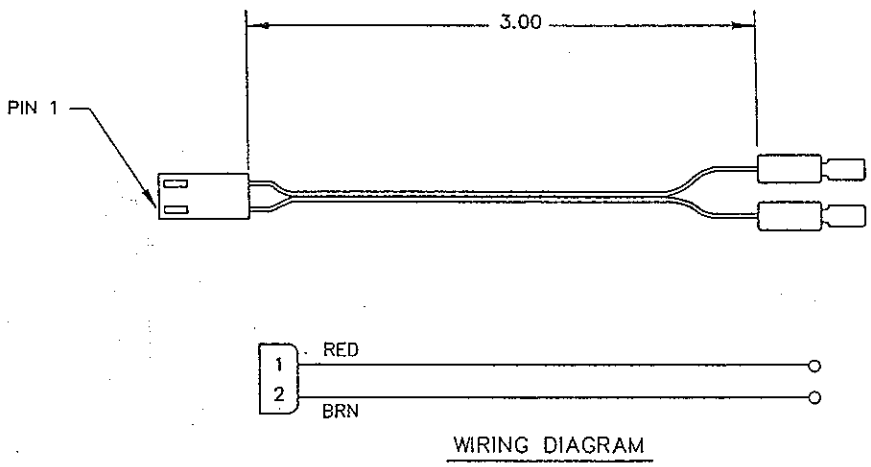


Figure 8-12. Pressure Harness Assembly (Item 268)

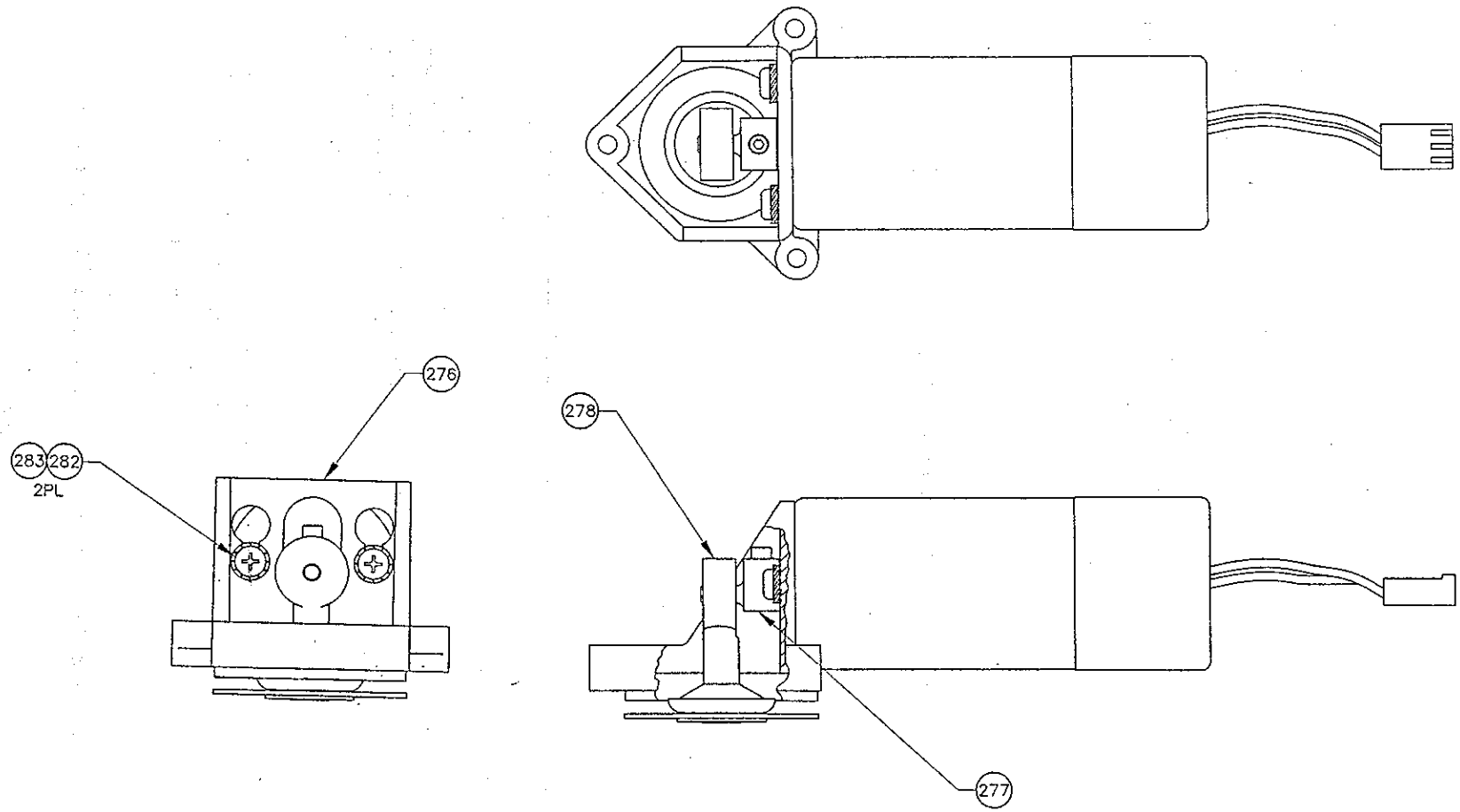


Figure 8-13. Pump Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
	*	ASSY,FINAL,4200			
003	132400	MEMORY ASSY	1	EA	
010	132401	REAR CASE ASSY	1	EA	
011	132402	FRONT CASE ASSY	1	EA	
012	131298	TBL,WRIT	1	EA	
013	132381	COVER,TE	1	EA	
015	132403	KIT,ASSY,LGC/ANALOG BD	1	EA	
016	131090	ASSY,PWR,REG BD	1	EA	
017	131070	ASSY,DSP/THERM BD	1	EA	
020	*	PNEUMATIC ASSY	0	EA	
021	132405	RESERVOIR ASSY (ITEMS 251,252, 258,260)	1	EA	
103	*	CASE,FRT	1	EA	
106	*	SW,MEMB	1	EA	
107	*	WINDOW,D	1	EA	
108	*	OVLY,SW	1	EA	
110	300361	SCREW,MA	4	EA	
112	303821	SCREW,MA	2	EA	
113	303822	SCREW,TR	11	EA	
114	303810	SP,PCB,S	5	EA	
115	303811	SP,PCB,S	1	EA	
116	300037	WASHER	1	EA	
117	132367	TRANSFORMER SHIELD	1	EA	
119	303926	DUCKBILL CHECK VALVE	1	EA	
120	303884	BRASS INSERT	4	EA	
201	*	CASE,REAR	1	EA	
202	124373	BATT PAC CHARGED	1	EA	
203	131309	COVER,BA	1	EA	
204	127149	PAD,TOP	2	EA	
205	131119	ASSY,HAR,TRANSFORMER	1	EA	
206	302587	CKT BKR,	1	EA	
208	131438	BKT,MTG	1	EA	
209	303250	PWR CORD CONNECTOR	1	EA	
210	303249	ADPT,IEC	1	EA	
211	303724	BUMPER,R	4	EA	
212	300374	SCREW,MA	2	EA	
213	301696	SCREW,MA	2	EA	
214	303848	BUMPER,R	4	EA	
215	303823	SCREW,TR	3	EA	
217	303806	WSHR,FL	3	EA	
218	303807	WSHR,FL	3	EA	
219	131117	ASSY,HAR GROUND	1	EA	

*Parts listed witnout an assigned part number are not sold as individual parts.

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
220	131343	ASSY,HAR PWR	1	EA	
221	130978	ASSY,HAR BATTERY	1	EA	
222	127373	PAD,TOP	2	EA	
223	303449	TERM,XFRM	1	EA	
224	303267	TERM,XFRM	1	EA	
225	303015	CONNECTOR,XFRM	1	EA	
251	131311	BASE,RES	1	EA	
252	132406	MANIFOLD ASSY	1	EA	
253	132407	KIT,ASSY,PUMP	1	EA	
254	132408	KIT,ASSY,LEA	1	EA	
255	*	CHECK VA	1	EA	
256	*	RING,RET	1	EA	
257	303350	PRES SNS	1	EA	
258	303813	O-RING,2	1	EA	
259	303812	GROMMET	3	EA	
260	131495	GASKET,P	1	EA	
261	303109	TBG,SIL	1.5	FT	
262	303841	SCREW,MA	1	EA	
263	303823	SCREW,TR	3	EA	
264	302593	FITTING	1	EA	
265	*	VALVE,SO	1	EA	
266	303655	SCREW,TR	4	EA	
267	131085	ASSY,PNE TRAN BD	1	EA	
268	131344	ASSY,HAR OVP SENSOR	1	EA	
276	*	BKT,MOTO	1	EA	
277	*	ECCENTRIC	1	EA	
278	*	PISTON,4	1	EA	
282	303819	SCREW,MA	2	EA	
283	303824	WSHR,EXT	2	EA	
603	125569	LBL,S/N,REPLACEMENT	1	EA	
606	132319	LBL,NAME	1	EA	
608	131875	LBL,OPER	1	EA	
613	125569	LBL,S/N	0	EA	
641	131876	LBL,TRBS	1	EA	
701	132425	BOX,SHPG	1	EA	
702	132426	FOAM,SHP	1	EA	
703	132427	FOAM,SHP	1	EA	
705	303286	CORD,PWR	1	EA	
717	127335	TABLET	5	EA	

*Parts listed without an assigned part number are not sold as individual parts.

NOTES (UNLESS OTHERWISE SPECIFIED):

3. INSTALL CABLE TIE (ITEM 148) THRU BOARD AT LOCATIONS SHOWN, AND AROUND CAP (ITEM 44). POSITION CABLE TIE (ITEM 148) SUCH THAT CONNECTION OF CABLE ENDS ARE ON THE INBOARD SIDE OF THE CAP (ITEM 44), AND ON THE COMPONENT SIDE OF THE BOARD.

4. APPLY SILICONE BETWEEN TRANSISTORS (ITEM 21) AND HEATSINKS (ITEM 147), PRIOR TO INSTALLATION OF FASTENERS (ITEMS 152, 153).

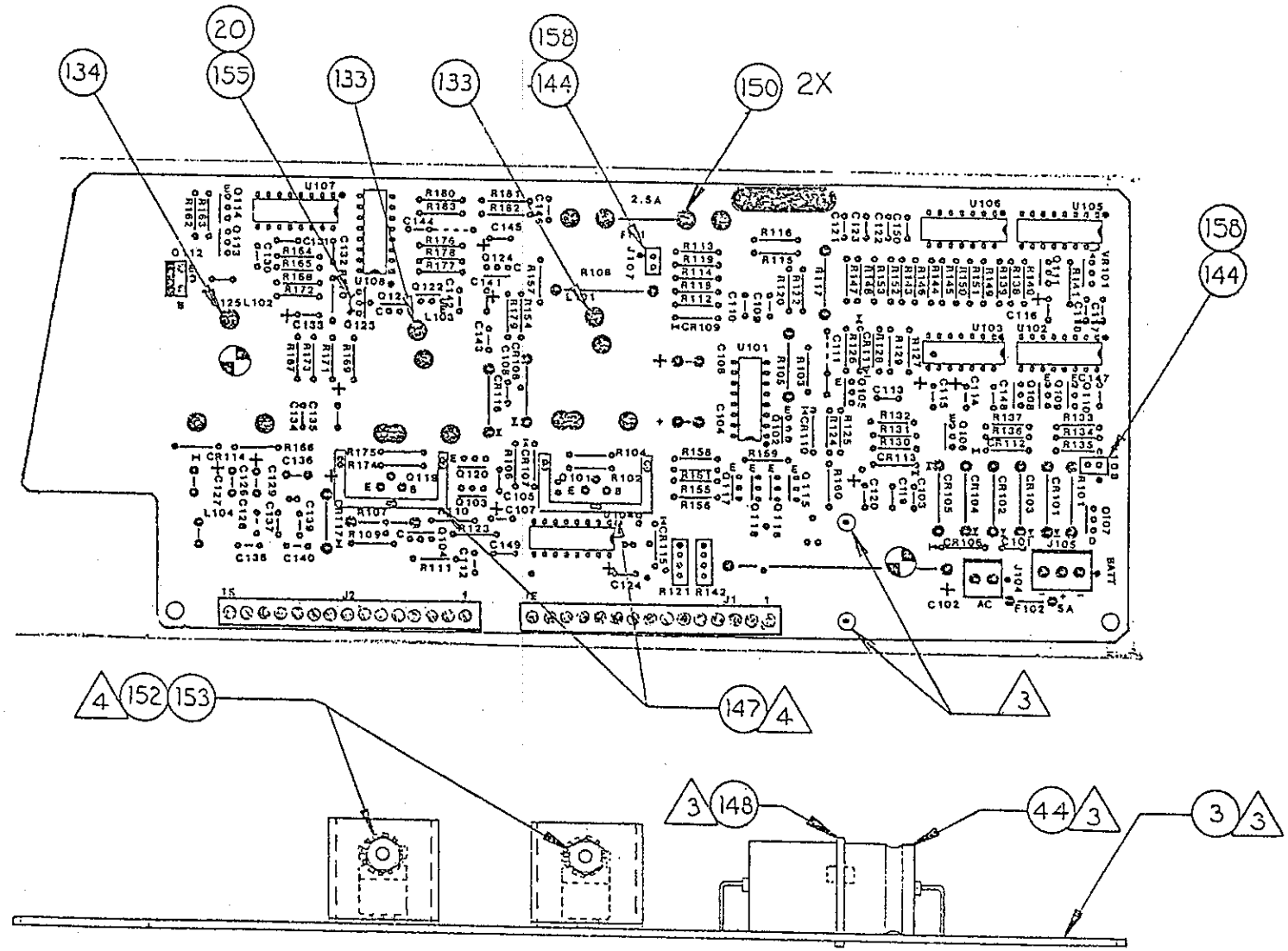


Figure 8-14. Power Regulator Board (Item 16)

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
016	131090	ASSY,PWR REG BD,4200(SEE FIG 8-5B)	1	EA	DWG010
010	302196	IC,TL494 VOLT REG 16 DIP	3	EA	U101
					U107
					U108
011	302524	IC,CD4027BE J-K FL-FL 16 DIP	1	EA	U102
012	302123	IC,4093B CMOS 2-IN NAND 14 DIP	1	EA	U103
013	302060	IC,4049 CMOS INV BFR 16 DIP	1	EA	U104
014	301753	IC,LM339N VOLT COMP 14 DIP	1	EA	U106
017	302939	XSTR,CA3096AE	1	EA	U105
018	302422	XSTR,SD1117	2	EA	Q107
					Q111
019	302566	XSTR,MPSA14	1	EA	Q122
020	303131	XSTR,2N5783	1	EA	Q123
021	301553	XSTR,6109	3	EA	Q101
					Q112
					Q119
022	302455	XSTR,PN2907A	5	EA	Q102
					Q108
					Q110
					Q113
					Q120
023	301551	XSTR,3569	7	EA	Q104
					Q105
					Q106
					Q109
					Q114
					Q121
					Q124
024	303091	XSTR,VP0106N3	1	EA	Q103
025	301928	XSTR,MPS/NP/PN/2222A(+)	2	EA	Q117
					Q118
026	302639	XSTR,2N6727	2	EA	Q115
					Q116
030	302424	DIODE,VOLT REF LM385BZ	1	EA	VR101
031	301453	DIODE,SW IN4148	4	EA	CR107
					CR110
					CR111
					CR112
032	302046	DIODE,RECT IN4004	1	EA	CR115
033	302163	DIODE,ZENER IN4689/LVA351A	1	EA	CR113
034	300585	DIODE,ZENER IN474D	1	EA	CR106
035	302941	DIODE,RECT MR504	4	EA	CR101
					CR102
					CR103
					CR104
036	302940	DIODE,RECT MR501	1	EA	CR105
037	302942	DIODE,RECT MR850	1	EA	CR108
038	301550	DIODE,RECT IN4936	1	EA	CR114

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
039	303173	DIODE,SCHOTTKY IN5820	1	EA	CR116
040	303281	DIODE,ZENER TVS 315	1	EA	CR109
041	303171	DIODE,ZENER TVS 505	1	EA	CR117
044	303012	CAP,ELCT AX 2200UF 20% 50V	1	EA	C102
045	303013	CAP,ELCT AX 220UF 20% 25V	3	EA	C106
					C127
					C136
046	303211	CAP,ELCT 330UF 20% 16V	1	EA	C115
047	303384	CAP,ELCT 100UF 20% 50V	1	EA	C104
050	303404	CAP,ELCT 100UF 20% 25V	2	EA	C125
					C135
051	303478	CAP,CER .1UF 100VDC	1	EA	C101
052	302421	CAP,TANT 3.3UF 10% 50V	1	EA	C145
053	301057	CAP,TANT 1UF 10% 35V	2	EA	C107
					C120
054	301561	CAP,TANT .47UF 10% 50V	2	EA	C114
					C116
055	300519	CAP,TANT 10UF 20% 25V	3	EA	C124
					C129
					C133
056	301704	CAP,TANT 33UF 10% 25V	1	EA	C141
060	301979	CAP,CER .10UF 20% 50V	20	EA	C103
					C108
					C113
					C117
					C119
					C122
					C123
					C128
					C130
					C132
					C137
					C138
					C139
					C140
					C142
					C143
					C147
					C148
					C149
					C150
061	301978	CAP,CER .022UF 20% 50V	2	EA	C109
					C110
062	301977	CAP,CER .01UF 20% 50-500V	6	EA	C105
					C118
					C121
					C126
					C134
					C146

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
063	300305	CAP,CER DISC 220PF 20% 1KV	1	EA	C112
064	300400	CAP,CER DISC 330PF 10% 50V	1	EA	C131
069	302805	CAP,M POLY .01UF 5% 50V	2	EA	C111
					C144
074	300191	RES,CF 1/2W 1K 5%	1	EA	R101
075	301121	RES,CF 1/2W 560 OHMS 5%	1	EA	R117
076	302172	RES,CF 1/2W 620 OHMS 5%	1	EA	R107
077	302211	RES,CF 1/2W 2K 5%	1	EA	R105
080	303049	RES,WW PRCN 3W 0.25 OHMS 1%	1	EA	R108
087	300434	RES,MET F 1/4W 19.6K 1%	1	EA	R146
088	301349	RES,MET F 1/4W 309 OHMS 1%	1	EA	R145
089	301350	RES,MET F 1/4W 316 OHMS 1%	1	EA	R144
090	300486	RES,MET F 1/4W 100.0K 1%	1	EA	R139
091	303282	RES,MET F 1/4W 301.0K 1%	1	EA	R138
092	302263	RES,MET F 1/4W 20.0K 1%	1	EA	R170
093	303048	RES,MET F 1/4W 75.0K 1%	1	EA	R143
094	303046	RES,MET F 1/4W 4.99K 1%	1	EA	R171
096	302394	RES,MET F 1/4W 8.66K 1%	1	EA	R120
097	301547	RES,MET F 1/4W 6.04K 1%	2	EA	R113
					R180
098	302395	RES,MET F 1/4W 4.53K 1%	1	EA	R122
103	300105	RES,CF 1/4W 47 OHMS 5%	1	EA	R162
104	300109	RES,CF 1/4W 68 OHMS 5%	2	EA	R102
					R174
105	300124	RES,CF 1/4W 300 OHMS 5%	1	EA	R178
106	300129	RES,CF 1/4W 470 OHMS 5%	1	EA	R103
107	300132	RES,CF 1/4W 620 OHMS 5%	1	EA	R164
108	300137	RES,CF 1/4W 1.0K 5%	9	EA	R124
					R136
					R149
					R154
					R157
					R160
					R163
					R175
					R176
109	300147	RES,CF 1/4W 2.7K 5%	1	EA	R109
110	300148	RES,CF 1/4W 3.0K 5%	1	EA	R110
111	300153	RES,CF 1/4W 4.7K 5%	2	EA	R130
					R135
112	300133	RES,CF 1/4W 680 OHMS 5%	2	EA	R158
					R161
113	300139	RES,CF 1/4W 1.2K 5%	1	EA	R118
114	300143	RES,CF 1/4W 1.8K 5%	1	EA	R112

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
115	300154	RES,CF 1/4W 5.1K 5%	8	EA	R114
					R165
					R167
					R168
					R169
					R172
					R182
					R183
116	300161	RES,CF 1/4W 10K 5%	13	EA	R111
					R123
					R125
					R128
					R133
					R134
					R148
					R150
					R151
					R155
					R156
					R159
					R179
117	300177	RES,CF 1/4W 47K 5%	4	EA	R126
					R131
					R132
					R137
118	300170	RES,CF 1/4W 24K 5%	2	EA	R115
					R116
119	300151	RES,CF 1/4W 3.9K 5%	1	EA	R177
120	300185	RES,CF 1/4W 100K 5%	5	EA	R140
					R147
					R152
					R153
					R173
121	300178	RES,CF 1/4W 51K 5%	1	EA	R119
122	300172	RES,CF 1/4W 30K 5%	2	EA	R166
					R181
123	300200	RES,CF 1/4W 430K 5%	1	EA	R141
124	300209	RES,CF 1/4W 1M 5%	3	EA	R106
					R127
					R129
125	300173	RES,CF 1/4W 33K 5%	1	EA	R104
127	303800	POT, CERMET, 1K 10%, 0.5W	1	EA	R121
128	303799	POT, CERMET,TRIM, 20K 10% 0.5W	1	EA	R142
130	301680	FUSE,2.5A 250V NORM-BLO	1	EA	F101
131	303425	FUSE,SUB-MINI 5A 125V	1	EA	F102
133	127555	INDUCTOR, 300UH	2	EA	L101
					L103

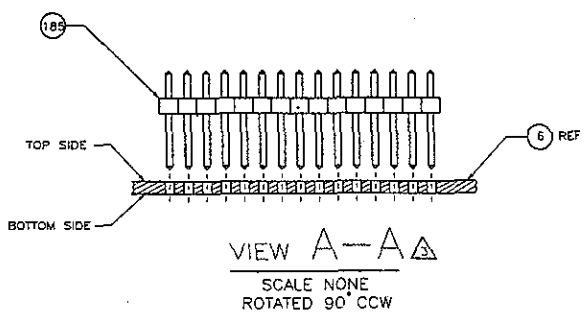
ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
134	127556	INDUCTOR, 167UH	1	EA	L102
135	127557	INDUCTOR, 7UH	1	EA	L104
139	303856	TERM HDR,RTANG, 15P, .156 CTR	2	EA	J001 J002
141	302646	TERM HDR,3P FRICT LK 0.100C	2	EA	J103 J106
142	303016	TERM HDR,3P 0.156 CTR	1	EA	J105
143	303017	TERM HDR,2P 0.156 CTR	1	EA	J104
144	301578	TERM HDR,36/P 0.100 SP	1	EA	J107 J108
147	303361	HEAT SINK,H:0.95 FOR PLSTC	2	EA	
149	301044	TIE STRAP,CBL 0.62-1.25 MAX	1	EA	
150	303164	CLIP,FUSE PC/TABS 0.250 DIA	2	EA	
152	300330	SCREW,MACH 6-32X1/4 PNH PHH	2	EA	
153	300036	NUT,KEP 6-32 S PL	2	EA	
155	303394	INSUL,TRANS,FOR3/4 LEAD TO-5	1	EA	
158	302547	JMPR,L:0.200 W:0.100 H:0.270	2	EA	P107 P108

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Item numbers refer to logic board components.
2. Install J5 (item 185) with longer pins soldered to logic/analog board.

HIGHEST REFERENCE DESIGNATOR USED								
U50	R131	C108	RN8	CR35	P1	LS2	D19	VR2
J82	D51	Y2	S2	J10				

REFERENCE DESIGNATOR NOT USED							
R58	R62	R68	R88	R89	R103	CR20	CR21
R122-R130		CR8-CR11		CR14-CR16		CR25-CR27	



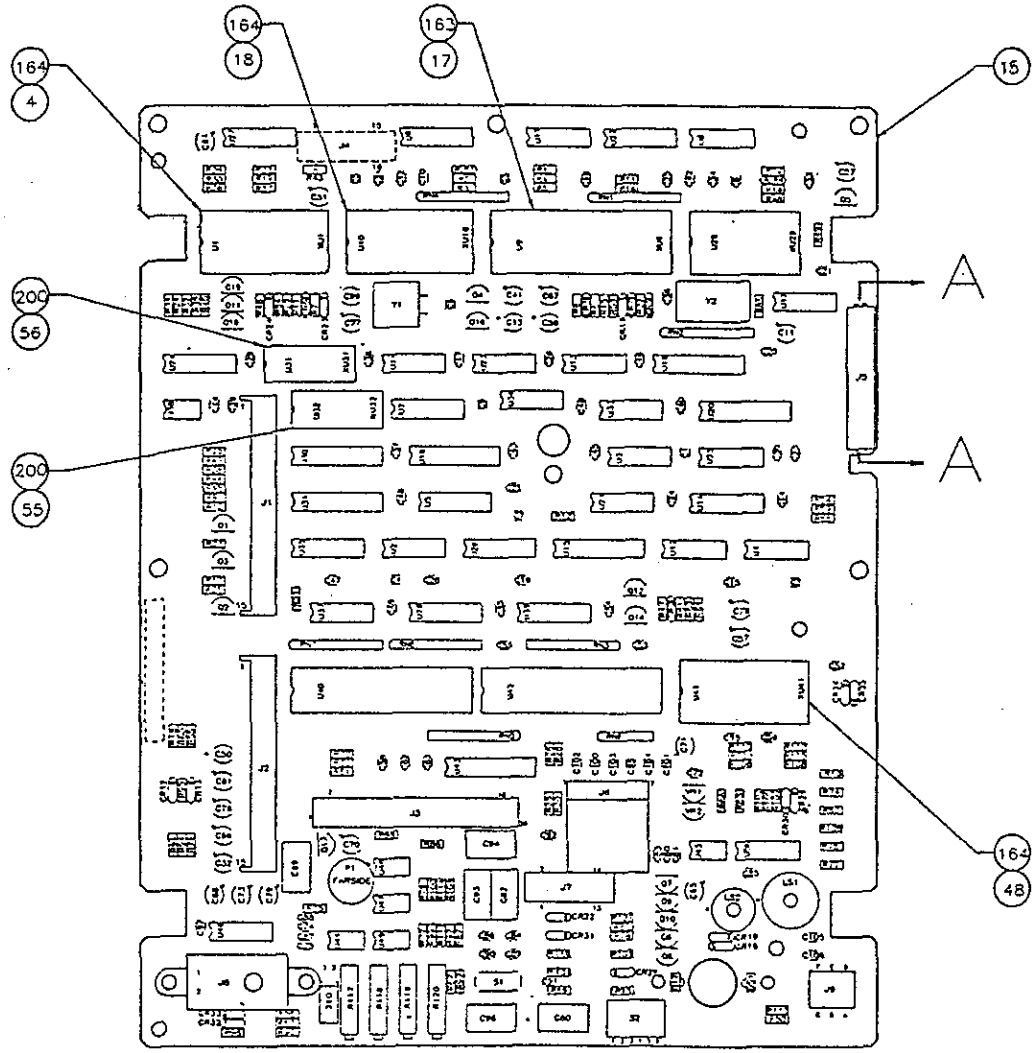


Figure 8-15. Logic/Analog Board (Item 015)

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
015	132403	KIT ASSY LOGIC BD (SEE FIG 8-5B)	1	EA	DWG010
004	132400	W/REV4 150006 KIT	1	EA	U001
005	131524	PARTS,CIMII,LGC/ANLG,4200 (SEE APPENDIX A)	AR	EA	
011	302961	IC,2-IN OR 14 DIP 74HC32	1	EA	U002
012	301557	IC,4001 CMOS 2-INP NR 14 DIP	1	EA	U003
013	302694	IC,2-IN NAND 14 DIP 74CH00	2	EA	U004
					U012
104	302759	IC,74CH139 CMOS 16 DIP	1	EA	U005
015	302760	IC,74HC08 CMOS 2/AND 14 DIP	1	EA	U006
016	302130	IC,40174B CMOS FL/FL 16 DIP	1	EA	U007
017	302756	IC,MSC80C85A MICROPROC. 40 DIP	1	EA	U009
018	303639	IC,CMOS RAM 8KX8 28 DIP	1	EA	U010
019	302962	IC,DCDR/DEMUX 16 DIP 74HC138	1	EA	U011
020	301631	IC,4025 CMOS 3-INP NOR 14 DIP	1	EA	U013
021	303257	IC,74HC245 XCVR 20 DIP	2	EA	U016
					U030
022	125007	IC,CMOS,7 STAGE BINARY COUNTER	1	EA	U017
033	302964	IC,BUFFER H 20 DIP 74HC244N	3	EA	U015
					U018
					U020
034	301558	IC,4011 CMOS 2-INP NAND 14 DIP	1	EA	U019
035	303258	IC,74HC74 D FL/FL 14 DIP	1	EA	U021
036	301968	IC,4020B CMOS CNTR/DIV 16 DIP	1	EA	U022
037	302123	IC,4093B CMOS 2-IN NAND 14 DIP	3	EA	U023
					U033
					U036
038	302252	IC,4040B CMOS CNTR/DIV 16 DIP	3	EA	U008
					U024
					U026
039	301632	IC,4013B CMOS FL/FL 14 DIP	1	EA	U025
040	302635	IC,4052B CMOS 16 DIP	1	EA	U027
041	302060	IC,4049 CMOS INV BFR 16 DIP	2	EA	U028
					U039
042	303849	IC,74HCT04A,HEX INVERT,14 PIN	1	EA	U014
043	303850	IC,74HCT138,3-8 DECODE,16 PIN	1	EA	U035
044	302695	IC,H SP LTCH 20 DIP 74HC373	1	EA	U034
045	302960	IC,2-IN NOR 14 DIP 74HC02	1	EA	U037
046	302369	IC,LM393N VOLT COMP 8 DIP	1	EA	U038
047	302629	IC,8255A PRPHL INTFC 40 DIP	2	EA	U040
					U042
048	302385	IC,ADC0809N A/D CONV 28 DIP	1	EA	U041
049	302628	IC,AM6012PC/DC D/A CONV 20 DIP	1	EA	U043

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
050	302995	IC,CA3193AE OPAMP 8 DIP	4	EA	U044
					U047
					U048
					U049
051	302016	IC,LM358N OPAMP 8 DIP	1	EA	U045
052	302631	IC,LF444CN JFET OPAMP 14 DIP	1	EA	U046
053	301554	IC,LM324NA OPAMP 14 DIP	1	EA	U050
055	132212	PLD,MODE STATE MACHINE,4200	1	EA	U032
056	132210	PLD,PRESS STATE MACHINE,4200	1	EA	U031
066	300161	RES,CF 1/4W 10K 5%	22	EA	R001
					R003
					R004
					R005
					R006
					R009
					R011
					R012
					R016
					R020
					R025
					R026
					R028
					R032
					R038
					R040
					R044
					R048
					R049
					R053
					R086
					R095
067	300146	RES,CF 1/4W 2.4K 5%	1	EA	R002
068	300153	RES,CF 1/4W 4.7K 5%	5	EA	R010
					R033
					R036
					R052
					R077
069	300135	RES,CF 1/4W 820 OHMS 5%	1	EA	R072
070	300194	RES,CF 1/4W 240K 5%	2	EA	R015
					R107
071	300209	RES,CF 1/4W 1M 5%	1	EA	R096
072	300193	RES,CF 1/4W 220K 5%	1	EA	R029

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
073	300401	RES,MET F 1/4W 1.0K 1%	6	EA	R030
					R035
					R066
					R101
					R112
					R115
074	302976	RES,MET F 1/4W 26.7K 1%	1	EA	R023
075	302972	RES,MET F 1/4W 13.7K 1%	1	EA	R019
076	300432	RES,MET F 1/4W 25.5K 1%	1	EA	R024
077	301548	RES,MET F 1/4W 15.8K 1%	1	EA	R031
078	300113	RES,CF 1/4W 100 OHMS 5%	2	EA	R042
					R045
079	300137	RES,CF 1/4W 1.0K 5%	8	EA	R021
					R027
					R047
					R051
					R102
					R108
					R113
					R121
080	302618	RES,MET F 1/4W 15.0K 1%	2	EA	R034
					R043
081	300126	RES,CF 1/4W 360 OHMS 5%	1	EA	R017
082	302977	RES,MET F 1/4W 45.3K 1%	1	EA	R037
083	300189	RES,CF 1/4W 150K 5%	1	EA	R022
084	302395	RES,MET F 1/4W 4.53K 1%	2	EA	R061
					R087
085	301450	RES,MET F 1/4W 8.25K 1%	1	EA	R063
086	302255	RES,MET F 1/4W 1.78K 1%	1	EA	R064
087	300129	RES,CF 1/4W 470 OHMS 5%	6	EA	R054
					R055
					R059
					R060
					R065
					R093
088	300154	RES,CF 1/4W 5.1K 5%	1	EA	R070
089	300144	RES,CF 1/4W 2.0K 5%	1	EA	R081
090	303047	RES,MET F 1/4W 63.4K 1%	2	EA	R057
					R109
091	301993	RES,MET F 1/4W 56.2K 1%	1	EA	R090
092	300436	RES,MET F 1/4W 5.11K 1%	2	EA	R056
					R078
093	300152	RES,CF 1/4W 4.3K 5%	1	EA	R091
094	300191	RES,CF 1/4W 180K 5%	1	EA	R083
095	302392	RES,MET F 1/4W 3.01K 1%	1	EA	R073
096	301389	RES,MET F 1/4W 825 OHMS 1%	1	EA	R075

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
097	300185	RES,CF 1/4W 100K 5%	4	EA	R008
					R046
					R074
					R079
098	301989	RES,MET F 1/4W 12.1K 1%	2	EA	R098
					R100
099	300404	RES,MET F 1/4W 10.0K 1%	5	EA	R071
					R092
					R104
					R111
					R114
100	302817	RES,MET F 1/4W 38.8K 1%	1	EA	R116
101	302372	RES,MET F 1/4W 90.9K 1%	1	EA	R080
102	300195	RES,CF 1/4W 270K 5%	1	EA	R105
103	300105	RES,CF 1/4W 47 OHMS 5%	3	EA	R041
					R076
					R110
104	300183	RES,CF 1/4W 82K 5%	1	EA	R106
105	300169	RES,CF 1/4W 22K 5%	1	EA	R131
106	302699	RES,JMPR 0 OHM 2.5A MAX	1	EA	R067
107	300187	RES,CF 1/4W 120K 5%	1	EA	R082
108	300177	RES,CF 1/4W 47K 5%	2	EA	R039
					R069
109	300093	RES,CF 1/4W 15 OHMS 5%	2	EA	R084
					R085
110	300178	RES,CF 1/4W 51K 5%	1	EA	R050
111	300089	RES,CF 1/4W 10 OHMS 5%	2	EA	R013
					R018
112	300173	RES,CF 1/4W 33K 5%	1	EA	R094
113	300197	RES,CF 1/4W 330K 5%	1	EA	R007
114	302460	RES NTWK,6 SIP 5R 10K 2%	1	EA	RN006
115	302327	RES NTWK,10 SIP 9R 4.7K 2%	1	EA	RN002
116	302297	RES NTWK,10 SIP 9R 10K 2%	6	EA	RN001
					RN003
					RN004
					RN005
					RN007
					RN008
117	300517	RES,MET F 1/4W 30.1K 1%	1	EA	R097
118	301357	RES,MET F 1/4W 374 OHMS 1%	1	EA	R099
127	302623	POT, CERMET 1K 10% 0.75W	2	EA	R117
					R119
128	300982	POT,TRIM 10K 10% 0.75W	1	EA	R118
129	302624	POT,CERMET 50K 10% 0.75W	1	EA	R120

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
130	301453	DIODE,SW IN4148	19	EA	CR001
					CR002
					CR003
					CR005
					CR006
					CR007
					CR012
					CR013
					CR017
					CR018
					CR019
					CR023
					CR024
					CR028
					CR029
					CR030
					CR031
					CR032
					CR033
131	302424	DIODE,VOLT REF LM385BZ	1	EA	VR001
132	301928	XSTR,MPS/NP/PN/2222A(+)	9	EA	Q001
					Q004
					Q005
					Q008
					Q009
					Q010
					Q012
					Q014
					Q018
133	302455	XSTR,PN2907A	2	EA	Q006
					Q013
134	302639	XSTR,2N6727	2	EA	Q003
					Q007
135	302422	XSTR,SD1117	4	EA	Q002
					Q011
					Q016
					Q019
136	303865	XSTR,LTP-80A-4,PHOTO,NPN	1	EA	Q017
137	302046	DIODE,RECT IN4004	1	EA	CR022
138	302197	DIODE,IN5817	2	EA	CR034
					CR035
139	302149	IC,78L05	1	EA	VR002
147	301823	CAP,TANT 2.2UF 10% 50V	1	EA	C056

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
148	301979	CAP,CER .10UF 20% 50V	60	EA	C001
					C002
					C004
					C005
					C007
					C008
					C009
					C010
					C012
					C014
					C015
					C016
					C017
					C018
					C019
					C020
					C021
					C022
					C023
					C024
					C025
					C026
					C028
					C029
					C030
					C031
					C034
					C035
					C036
					C037
					C038
					C039
					C040
					C043
					C044
					C045
					C046
					C047
					C048
					C049
					C053
					C054
					C055
					C059
					C062
					C063
					C074
					C075

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
					C080
					C081
					C085
					C086
					C087
					C088
					C089
					C090
					C091
					C092
					C095
					C097
149	301979	CAP,CER .10UF 20% 50V	2	EA	C003
					C052
150	302435	CAP,CER DISC 180F 10% 500/1KV	1	EA	C006
151	300519	CAP,TANT 10UF 20% 25V	16	EA	C011
					C013
					C027
					C032
					C050
					C051
					C057
					C061
					C065
					C066
					C068
					C073
					C076
					C078
					C079
					C099
152	302490	CAP,CER .01UF 20% 50V	4	EA	C058
					C072
					C083
					C084
154	301092	CAP,M POLY AX .047UF 5% 200V	1	EA	C069
155	301057	CAP,TANT 1UF 10% 35V	5	EA	C041
					C064
					C067
					C070
					C071
156	301413	CAP,TANT 33UF 10% 10V	1	EA	C077
157	300295	CAP,M POLY AX .10UF 10% 200V	4	EA	C082
					C093
					C094
					C096
158	300294	CAP,M PLY AX .47UF 10% 50/100V	1	EA	C060
159	302530	CRYSTAL,QTZ 6.0MHZ 76F838/MP-1	1	EA	Y001

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
160	302452	XDCR,AUD PC MNT	1	EA	LS002
161	302529	XDCR,AUD QMB-06	1	EA	LS001
162	303393	INSUL,CAP CK06	2	EA	
163	302158	SKT,IC 40/DIP L PF TIN	1	EA	XU009
164	302157	SKT,IC 28/DIP L PF TIN	2	EA	XU001
					XU010
165	303158	TERM HDR,M 40P .100 T SP	1	EA	J003
166	302965	CAP,MONO CER .047YF 10% 50V	1	EA	C042
176	131254	XDCR,PRES,LOW SPAN,4KA	1	EA	P001
177	303833	SW,MINI SLIDE,DPDT	1	EA	S001
178	303835	SW,PIANO DIP,6P,SIDE ACTUATED	1	EA	S002
179	302547	JMPR,L:0.200 W:0.100 H:0.270	2	EA	
182	303864	DIODE,IR EMIT,IRL-80A	1	EA	DS001
183	303857	TERM HDR SKT,REAR,15P, .156 CTR	2	EA	J001
					J002
185	303832	TERM HDR SKT,30P,.100 CTR	1	EA	J005
186	303834	CONN,FLAT FLX CBL,7P,.1 CTR	1	EA	J006
198	301010	CONN,PC 3/C 0.150 CTR	1	EA	J009
199	131455	REC,CUFF,4200	1	EA	J008
200	302680	SKT,IC 20/DIP L PF TIN	2	EA	XU031
					XU032
202	131359	HSG,SNSR,PROBE,4200	1	EA	
203	303527	TERM HDR,RTANG 2.P .100 CTR	1	EA	J010
204	131345	HARN,PNEU CTRL,4200	1	EA	J007

NOTES (UNLESS OTHERWISE SPECIFIED):

3. DS1-DS6 (ITEM 95) SHALL BE INSTALLED IN SOCKETS XDS1, XDS4 (ITEM 106).

4. LD2-LD13 (ITEM 99) SHALL BE INSTALLED IN SPACERS (ITEM 152).

6. RAISE U13 (ITEM 20) 1/8 INCH +/- 1/16 OFF BOARD.

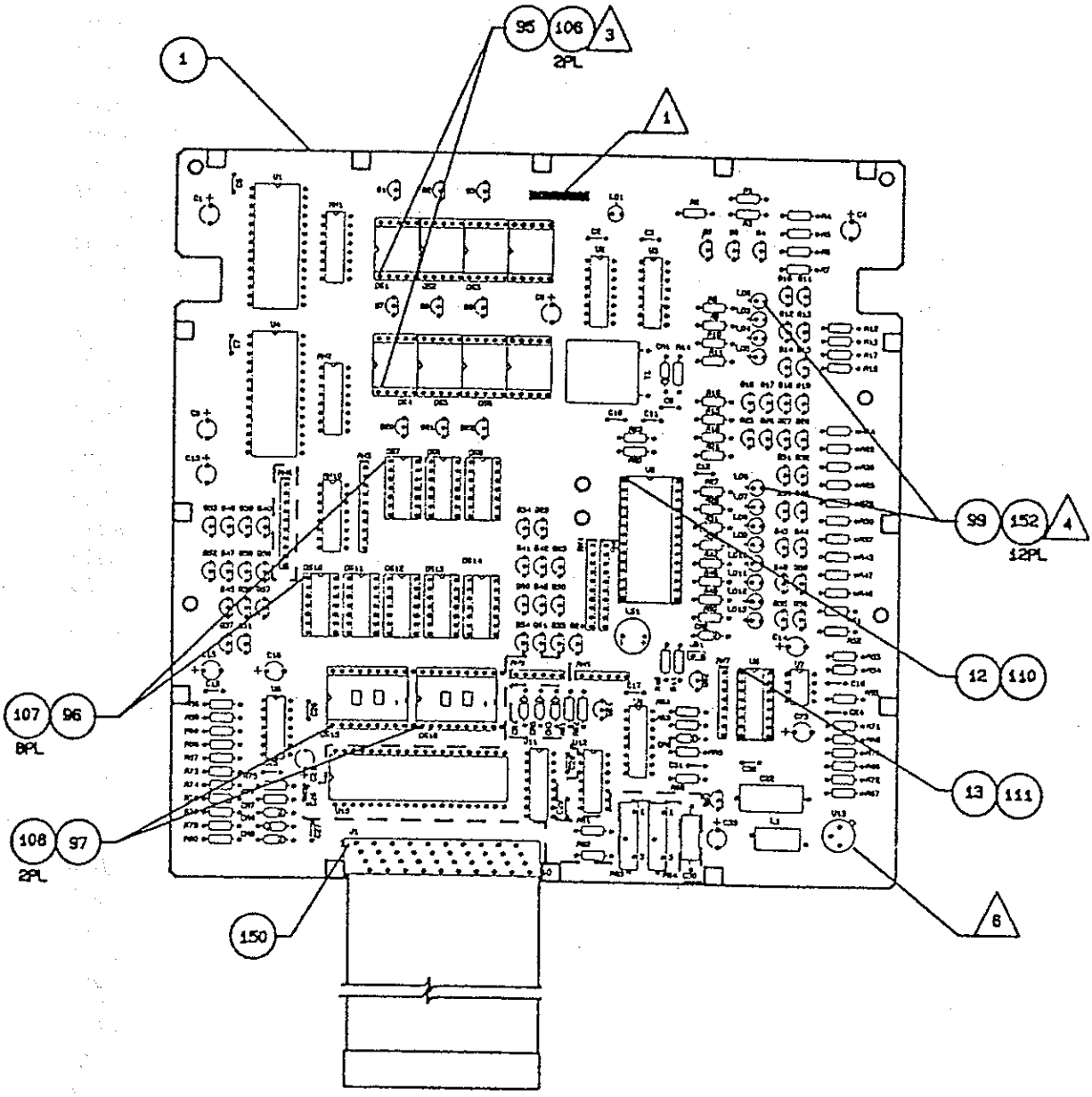


Figure 8-16. Display/Thermometer Board

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
017	131070	ASSY,DSPL/THERM BD,4200 (SEE FIG 8-5B)	1	EA	DWG010
010	302632	IC,MM74C912 CNTR/DRVR 28 DIP	2	EA	U001
					U004
011	303850	IC,74HCT138,3-8 DECODE,16 PIN	2	EA	U002
					U003
012	150010	IC,CPU,MASK PRGM,2K/4KA/1160	1	EA	U005
013	302448	IC,3162EX A/D CONV 16 DIP	1	EA	U006
014	302206	IC,CA3240 BIMOS OP AMP 8 DIP	1	EA	U007
015	302160	IC,4023B CMOS 3-IN NAND 14 DIP	1	EA	U008
016	302438	IC,CD40257BE CMOS 16 DIP	1	EA	U009
019	302761	IC,74HC04 14 DIP INVERTER	1	EA	U012
020	302451	IC,LM317H VOLT REG TO-5 OR 39	1	EA	U013
021	300161	RES,CF 1/4W 10K 5%	31	EA	R001
					R002
					R003
					R004
					R005
					R006
					R007
					R012
					R013
					R015
					R016
					R017
					R018
					R019
					R021
					R022
					R024
					R025
					R026
					R028
					R030
					R037
					R043
					R047
					R048
					R051
					R052
					R058
					R059
					R061
					R079

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
022	300133	RES,CF 1/4W 680 OHMS 5%	12	EA	R008
					R009
					R010
					R011
					R027
					R029
					R031
					R036
					R042
					R046
					R049
					R050
023	300185	RES,CF 1/4W 100K 5%	4	EA	R014
					R062
					R073
					R076
024	300137	RES,CF 1/4W 1.0K 5%	2	EA	R020
					R074
025	300209	RES,CF 1/4W 1M 5%	2	EA	R023
					R057
026	303000	RES NTWK,16 DIP 8R 82 OHMS 2%	1	EA	RN010
027	300177	RES,CF 1/4W 47K 5%	2	EA	R044
					R063
028	300145	RES,CF 1/4W 2.2K 5%	1	EA	R045
029	302429	RES,MET F 1/4W 4.42K 1%	1	EA	R053
030	300490	RES,MET F 1/4W 1.0M 0.1%	1	EA	R054
031	302445	RES,MET F 1/4W 138.600K 0.1%	1	EA	R055
032	300193	RES,CF 1/4W 220K 5%	4	EA	R056
					R065
					R075
					R077
033	300151	RES,CF 1/4W 3.9K 5%	1	EA	R060
034	300192	RES,CF 1/4W 200K 5%	2	EA	R064
					R078
035	300113	RES,CF 1/4W 100 OHMS 5%	1	EA	R066
036	301249	RES,MET F 1/4W 27.4 OHMS 1%	1	EA	R067
037	302442	RES,MET F 1/4W 2.80K 1%	1	EA	R068
038	302443	RES,MET F 1/4W 3.794K 0.1%	1	EA	R069
039	300131	RES,CF 1/4W 560 OHMS 5%	1	EA	R070
040	302441	RES,MET F 1/4W 1.91K 1%	1	EA	R071
041	301355	RES,MET F 1/4W 357 OHMS 1%	1	EA	R072
042	300178	RES,CF 1/4W 51K 5%	1	EA	R080
045	300982	POT,TRIM 10K 10% 0.75W	1	EA	R083
046	302624	POT,CERMET 50K 10% 0.75W	1	EA	R084
050	303001	RES NTWK,16 DIP 8R 56 OHMS 2%	1	EA	RN001
051	302999	RES NTWK,16 DIP 8R 68 OHMS 2%	1	EA	RN002
052	302297	RES NTWK,10 SIP 9R 10K 2%	2	EA	RN003
					RN006

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
053	302327	RES NTWK,10 SIP 9R 4.7K 2%	1	EA	RN004
054	302460	RES NTWK,6 SIP 5R 10K 2%	1	EA	RN005
055	302433	RES NTWK,8 SIP 7R 220K 2%	1	EA	RN007
060	302422	XSTR,SD1117	16	EA	Q001
					Q002
					Q003
					Q007
					Q008
					Q009
					Q020
					Q021
					Q022
					Q048
					Q054
					Q057
					Q060
					Q061
					Q063
					Q064

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
061	301928	XSTR,MPS/NP/PN/2222A(+)	37	EA	Q004
					Q005
					Q006
					Q010
					Q011
					Q012
					Q013
					Q014
					Q015
					Q016
					Q017
					Q018
					Q019
					Q023
					Q024
					Q025
					Q026
					Q027
					Q028
					Q029
					Q030
					Q031
					Q032
					Q033
					Q034
					Q035
					Q036
					Q037
					Q041
					Q042
					Q043
					Q044
					Q049
					Q050
					Q055
					Q056
					Q062
062	300702	XSTR,3638A	3	EA	Q038
					Q045
					Q051
063	302455	XSTR,PN2907A	8	EA	Q039
					Q040
					Q046
					Q047
					Q052
					Q053
					Q058
					Q059

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
065	301453	DIODE,SW IN4148	9	EA	CR001
					CR002
					CR003
					CR004
					CR005
					CR006
					CR007
					CR008
					CR009
070	300519	CAP,TANT 10UF 20% 25V	7	EA	C001
					C004
					C006
					C009
					C013
					C023
					C033
071	301979	CAP,CER .10UF 20% 50V	14	EA	C002
					C003
					C005
					C007
					C012
					C017
					C019
					C025
					C027
					C028
					C029
					C031
					C032
072	301513	CAP,CER DISC 560PF 10% 1KV	1	EA	C008
073	302435	CAP,CER DISC 18PF 10% 500/1KV	1	EA	C010
074	300555	CAP,CER DISC 56PF 10% 1KV	1	EA	C011
075	302489	CAP,TANT 4.7UF 10% 10V	1	EA	C014
076	301413	CAP,TANT 33UF 10% 10V	2	EA	C015
					C016
077	301978	CAP,CER .022UF 20% 50V	1	EA	C018
078	302490	CAP,CER .01UF 20% 50V	2	EA	C020
					C024
079	302421	CAP,TANT 3.3UF 10% 50V	1	EA	C021
080	302436	CAP,M MYLAR AX .27UF 10% 100V	1	EA	C022
090	302450	CRYSTAL,QTZ 2.000 MHZ	1	EA	Y001
091	301779	CHOKE,W BND VK 200 20/48	1	EA	L001
092	302452	XDCR,AUD PC MNT	1	EA	LS001
095	303843	DSPL,LED,HI-EFF R,7 SEG	6	EA	DS001
					DS002
					DS003
					DS004
					DS005
					DS006

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
096	302274	DSPL,7/SEG MAN4640AF	8	EA	DS007
					DS008
					DS009
					DS010
					DS011
					DS012
					DS013
					DS014
097	302134	DSPL,LED AN DL2416	2	EA	DS015
					DS016
098	303128	DIODE,LE GRN HLMP-3950	1	EA	LD001
099	303802	DIODE,LE,LO CURRENT,HI EFF RED	12	EA	LD002
					LD003
					LD004
					LD005
					LD006
					LD007
					LD008
					LD009
					LD010
					LD011
					LD012
					LD013
106	302158	SKT,IC 40/DIP L PF TIN	6	EA	XDS001
					XDS002
					XDS003
					XDS004
					XDS005
					XDS006
107	302029	SKT,IC 14/DIP L PF TIN	8	EA	XDS007
					XDS008
					XDS009
					XDS010
					XDS011
					XDS012
					XDS013
					XDS014
108	302778	SKT,IC 18/DIP TIN	2	EA	XDS015
					XDS016
110	302157	SKT,IC 28/DIP L PF TIN	1	EA	XU005
111	301601	SKT,IC 16/DIP L PF TIN	1	EA	XU006
150	131526	HARN,DSPL/THERM,4200(BOM)	1	EA	J001
151	B	PARTS,CIMII,DIP/THERM 4200 (SEE APPENDIX A)	1	AR	
152	303801	SP,LED,.250",NYL	12	EA	

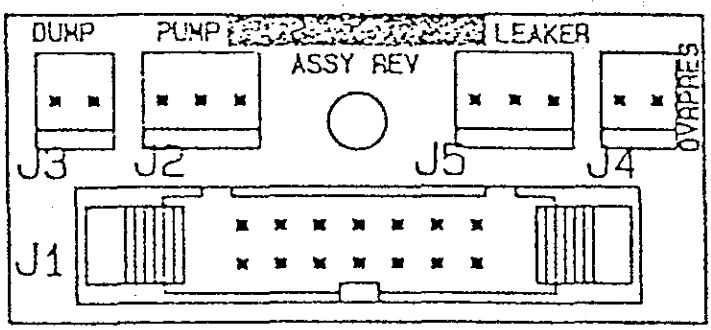


Figure 8-17. Pneumatic Transition Board (Item 267)

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
267	131085	ASSY,PNEU TRAN BD,4200(SEE FIG 8-7)	1	EA	DWG250
004	302645	TERM HDR,2P FRICT LK 0.100C	2	EA	J003 J004
005	302646	TERM HDR,3P FRICT LK 0.100C	2	EA	J002 J005
006	303847	TERM HDR,M,BOX,14P, 0.100CTR	1	EA	J001

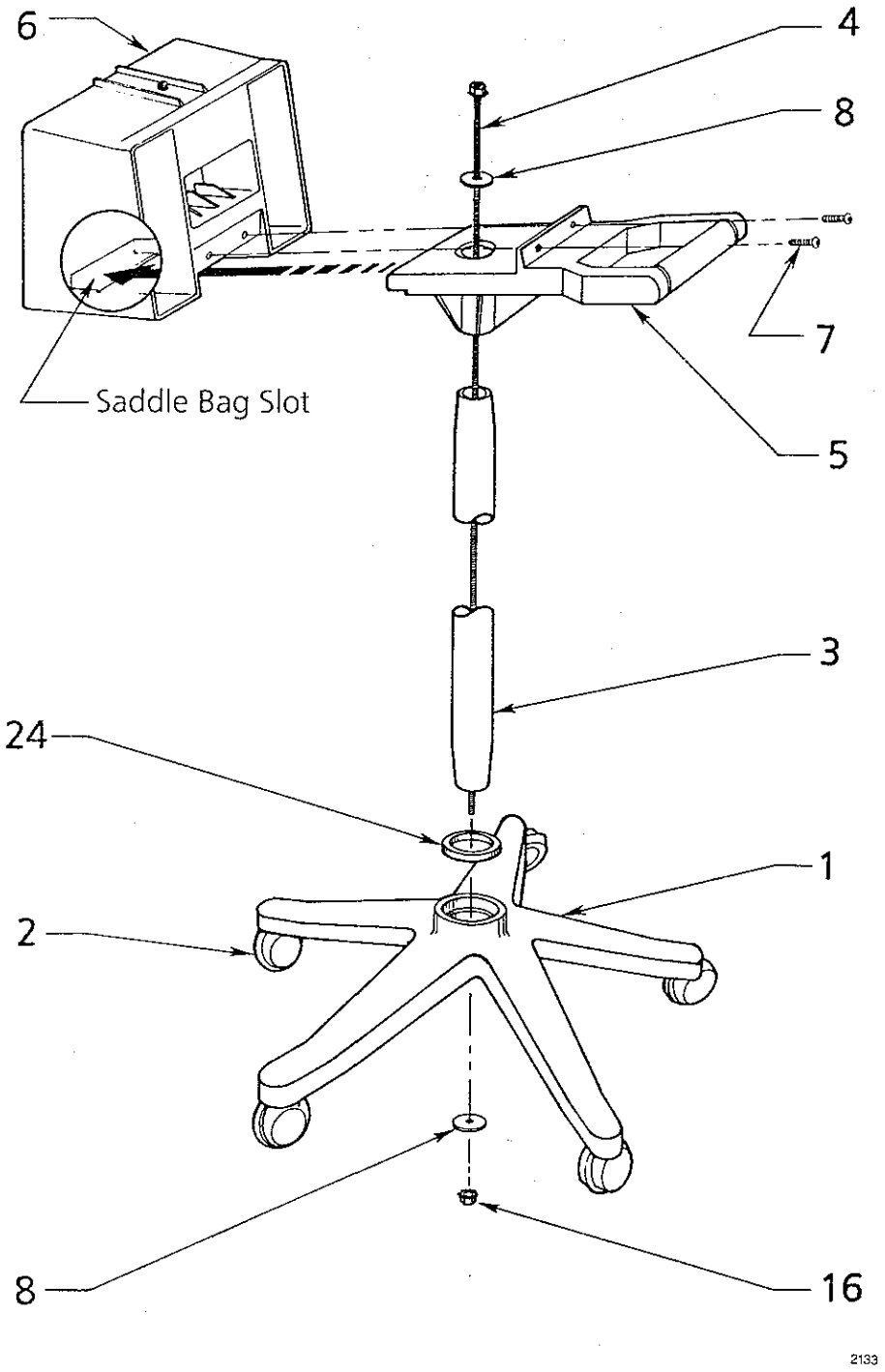


Figure 8-18A. Model 1042 Instrument Stand Final Assembly

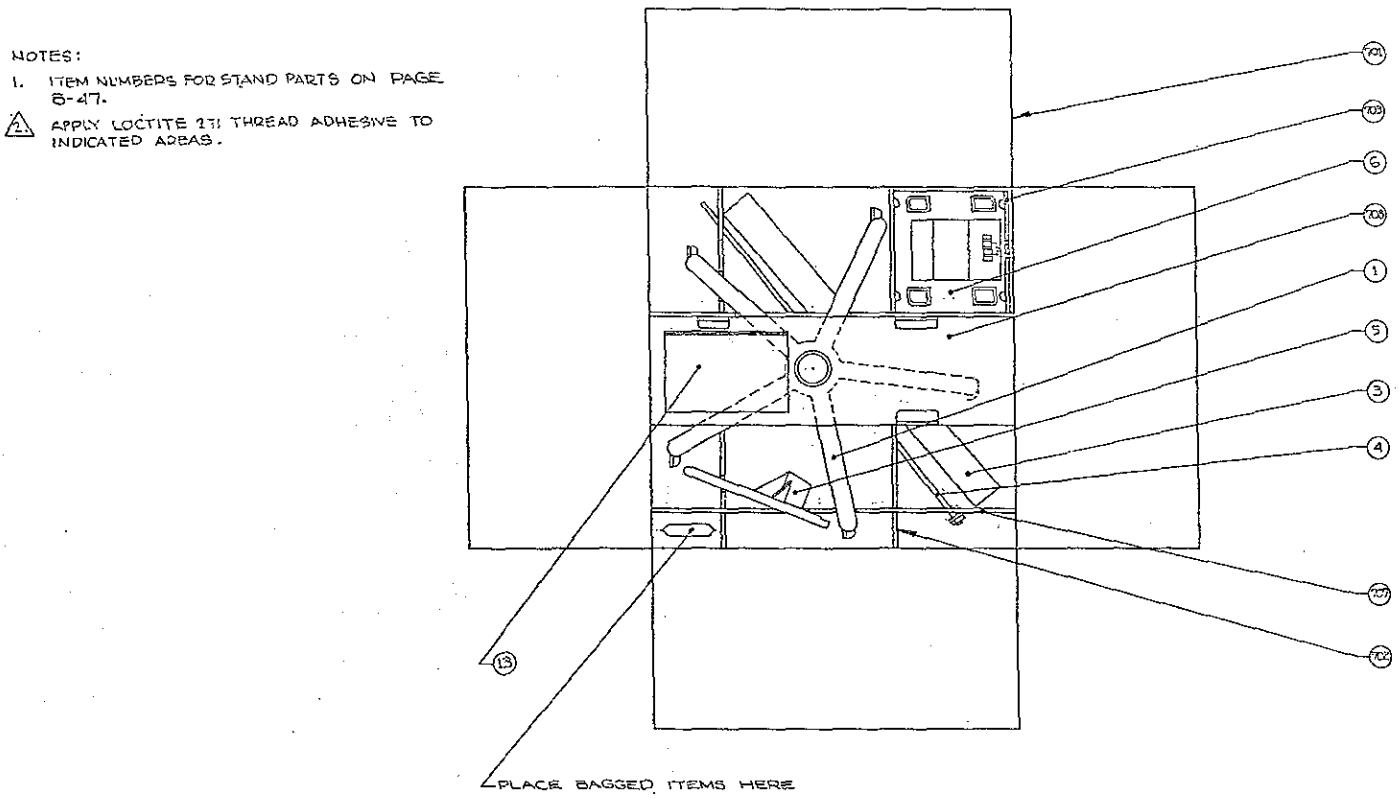


Figure 8-18B. Model 1042 Instrument Stand Final Assembly

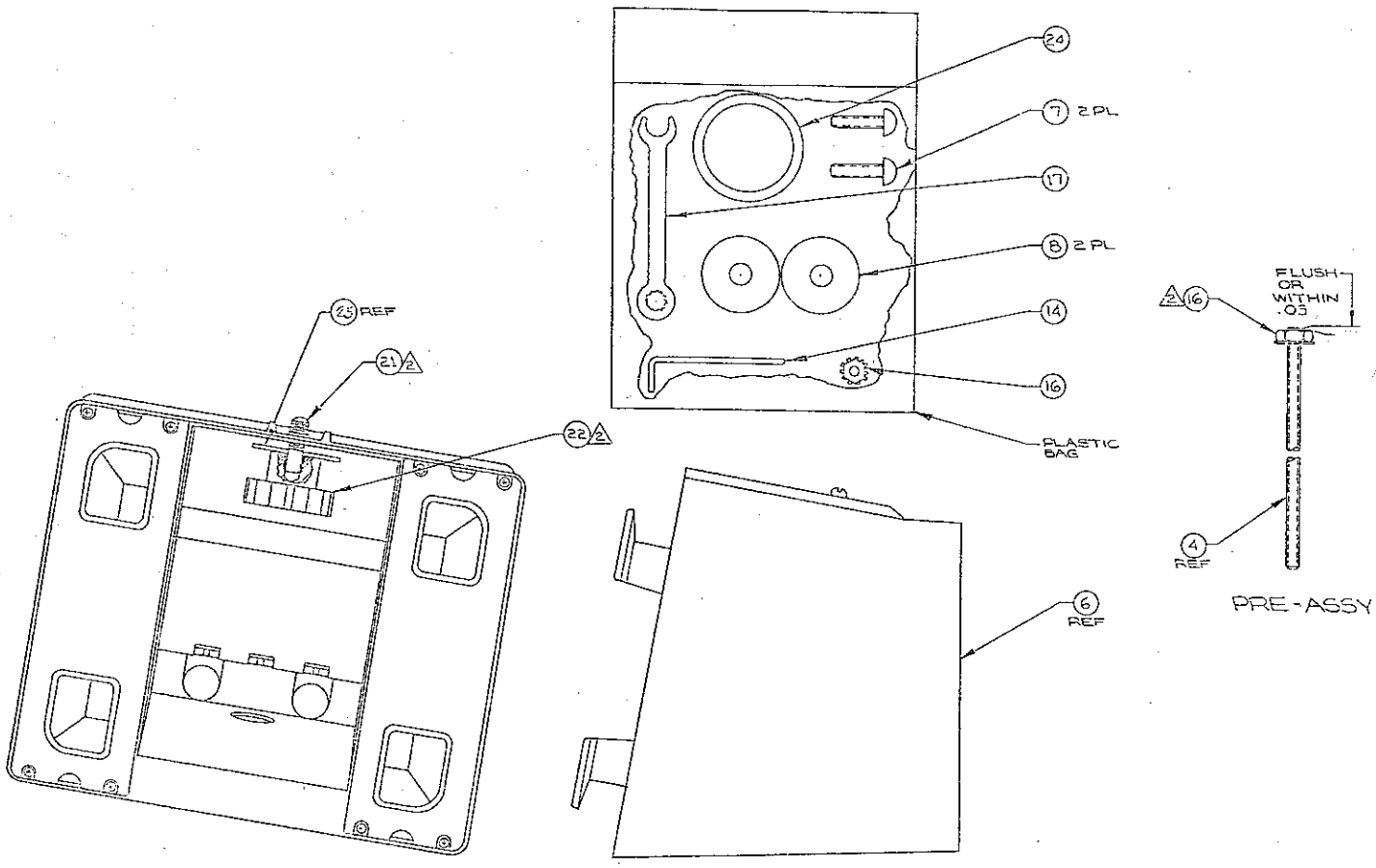


Figure 8-18C. Model 1042 Instrument Stand Final Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
1042 - INSTRUMENT STAND					
001	303854	BASE,CHAIR,22",W/O CASTERS		1 EA	
002	303853	CASTER,3" WHEEL,RUBBER TREAD		5 EA	
003	303858	TBG,STL,16 GA,1.75" DIA.		1 EA	
004	130852	ROD,PED POLE,1042		1 EA	
005	130847	HANDLE,1042		1 EA	
006	131490	ASSY,SADDLEBAGS,1042		1 EA	
	130850	COVER,PL (P/O ITEM 6)		2 EA	
	303823	SCREW, 4-20 X 5/8 (P/O ITEM 6)		8 EA	
007	303925	SCREW,1/4-20 X 5/8,BTHD CAP		2 EA	
008	303883	WSHR,1/4 X 1.5 X 0.63		2 EA	
011	130850	PL,COVER REAR		2 EA	
012	303823	SCREW 4-20 X 5/8		8 EA	
013	132174	INSTC,SETUP,1042		1 EA	
014	303253	WRENCH,HEX 5/32 ACR FL		1 EA	
016	300824	NUT,KEP 1/4-20 S PL		2 EA	
017	303894	WRENCH,COMBO,7/16",3"-5" LONG		1 EA	
021	126527	STUD,POL		1 EA	
022	303839	KNOB,FLUTED,BLK,1 3/4 DIA.		1 EA	
024	303852	TETRASEAL		1 EA	
025	303923	WASHER		2 EA	
701	131491	BOX,SHPG,1042		1 EA	
702	131492	INS,PKG,BASE,1042		1 EA	
703	131064	INS,PKG,SADDLEBAG,1042		1 EA	
707	132147	INS,BASE(#2),PKG,1042		1 EA	
708	132148	INS,BASE OVERCAP,PKG,1042		1 EA	

APPENDIX A

PARTS FOR COMPUTER INTERFACE MODULE II

FIGURE ITEM	PART NUMBER	DESCRIPTION	QTY	ISS UOM	REF DES
A	PARTS,CIMII,LGC/ANLG,4200		AR	EA	
001	303259	IC,MC146818P/L CLK/RAM 24 DIP	1	EA	U029
002	300161	RES,CF 1/4W 10K 5%	1	EA	R014
003	301453	DIODE,SW IN4148	1	EA	CR004
004	301979	CAP,CER .10UF 20% 50V	1	EA	C033
006	303155	CRYSTAL OSC,LXO-32.768	1	EA	Y002
007	302185	TERM HDR,72/P 0.100 SP	1	EA	J004
B	PARTS,CIMII,DSPL/THERM,4200		AR	EA	
001	303260	IC,D8741A PER CONTR 40 DIP	1	EA	U010
002	303114	IC,CD4098BE CMOS VBRTR 16 DIP	1	EA	U011
003	300137	RES,CF 1/4W 1.0K 5%	1	EA	R081
004	300209	RES,CF 1/4W 1M 5%	1	EA	R082
005	303288	RES NTWK,10 SIP 9R 1K 2%	1	EA	RN008
006	302713	RES NTWK,6 SIP 5R 4.7K 2%	1	EA	RN009
007	301979	CAP,CER .10UF 20% 50V	1	EA	C026
008	302824	CAP,M PLY AX .001UF 10% 100VDC	1	EA	C030
009	302158	SKT,IC 40/DIP L PF TIN	1	EA	XU010

PREFIX KFF DESCRIPTION Vital Signs Monitor

INSPECTION INTERVAL 180 Days MODEL Vital-Check Model 4200

MANUFACTURER IVAC

TEST EQUIPMENT REQUIRED
DPM-II
Patient Cuff
Manometer bulb and test setup
Temperature calibration tester (pn 828A)
Safety Analyzer

DECONTAMINATION
1.1 Follow general decontamination procedures.

BREAKDOWN
1.9 Route the unit to the wipe-down station.

CLEANING
1.12 Perform the general wipe-down procedures.
5.3 Initial and affix the Biomedical Inspection sticker.
1.15 Route the unit to the assembly area.

FUNCTIONAL PROCEDURE
3.1 Check the cleanliness of the unit.
3.2 Check the unit for damage.

2.1 Perform the ground resistance test. **RECORD RESULTS**
Record the reading under 2.1 on Form 200A.

2.2 Perform the chassis to ground AC leakage test (I). **RECORD RESULTS**
Record the reading under 2.2 on Form 200A (x/x).

1. Set the S2 DIP switch (located at the bottom of the unit, almost directly under the temperature probe storage well, accessible through the louvers) in the CAL mode as follows:
Using a non-metallic tool (such as the wooden end of a Q-tip):
a. Set switches No. 1, 2, and 3 to the down position.
b. Set switch No. 4 to the up position (switch 5 should already be in the up position).

NOTE: The unit must be plugged into an AC outlet for steps 3-7.

**This procedure is the property of UHS.
Duplication is permitted only upon the written approval of UHS.
UHS is a registered trademark of Universal Hospital Services, Inc.**

2. Assemble the test setup as illustrated on the last page of this procedure.
Connect the assembly to the unit.

NOTE: Leaky fittings will reduce the reliability of the test.

Wrap the cuff around a cylinder 3-5 inches in diameter (such as a roll of paper towels).

3. Press the ON/OFF switch to turn the instrument on.
The information display will read "TESTING", then CAL "CAL" will then be displayed.
The SYSTOLIC display will read "000".

4. 4.2.1 Press the MODE SELECT switch until the MANUAL indicator is lit. **RECORD RESULTS**
Press the PRES. SELECT switch until the 200 indicator is lit.
Using the bulb, inflate the cuff until the SYSTOLIC display indicates a reading of "300"-"302".
The DIASTOLIC display must read "48"-"168".
The DPM-II must indicate a pressure reading of 295-307 mmHg.
Record the pressure reading of the DPM-II under 4.2.1 on Form 200A.

5. Press the PRES. SELECT switch until the 150 indicator is lit.
Slowly release pressure from the cuff until the SYSTOLIC display indicates a reading of "250"-"252".
The DIASTOLIC display must read "68"-"148".
The DPM-II must indicate a pressure reading of 248-254 mmHg.

6. Press the PRES. SELECT switch until the 100 indicator is lit.
Slowly release pressure from the cuff until the SYSTOLIC display indicates a reading of "150"-"152".
The DIASTOLIC display must read "88"-"128".
The DPM-II must indicate a pressure reading of 149-253 mmHg.

7. Turn the unit off and remove the unit from the CAL mode by setting switch 4 of the S2 DIP switch to the down position.

**This procedure is the property of UHS.
Duplication is permitted only upon the written approval of UHS.
UHS is a registered trademark of Universal Hospital Services, Inc.**

8. 4.2.2 Insert the calibration tester into the temperature probe connector socket. **RECORD RESULTS**
Turn the unit back on.
Set the NORMAL/MONITOR mode switch to MONITOR.
The TEMPERATURE display must flash "98.4"-"98.8".
Record the displayed temperature under 4.2.2 on Form 200A.

NOTE: If the temperature probe is in the probe storage well (adjacent to the probe connector socket), the display will not function.
Remove the probe from the storage well.

9. Set the NORMAL/MONITOR mode switch to NORMAL.
Verify that the TEMPERATURE display reads "98.4"-"98.8".
Verify that only the "F" flashes on and off.

10. Repeatedly press the Press. Select switch until the 150 indicator is lit.
Press the Start switch.
The unit will start inflating.
Check that the pump is not excessively noisy while the unit is inflating.

Turn the unit off.
Remove the calibration tester from the instrument.
Remove the test assewmbly from the unit.

5.3 Sign and date the Biomedical Inspection sticker.
5.4 Documentation.

6.1 Roll and band the power cord.
6.3 Place the unit in a plastic bag.
6.4 Route the unit to the clean equipment holding area.

**This procedure is the property of UHS.
Duplication is permitted only upon the written approval of UHS.
UHS is a registered trademark of Universal Hospital Services, Inc.**